Volume XIX Number 11

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DISEASES OF THE NERVOUS SYSTEM

A Practical Journal on Psychiatry and Neurology

NOVEMBER
1958

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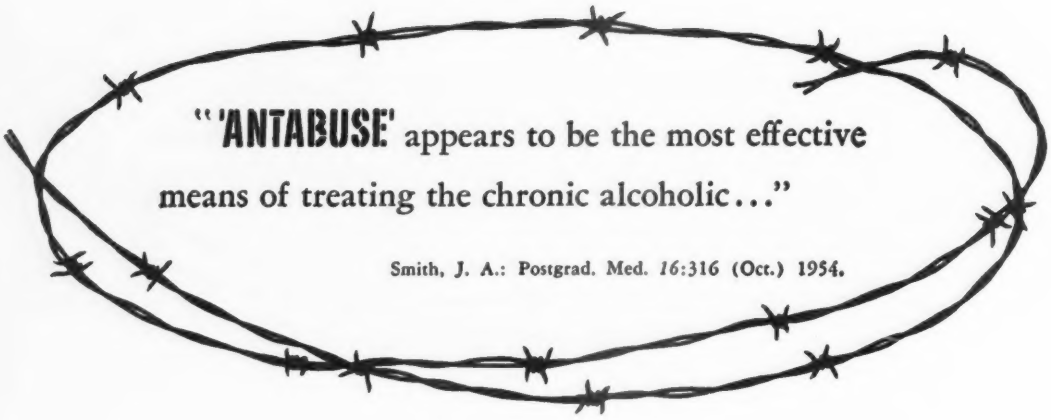

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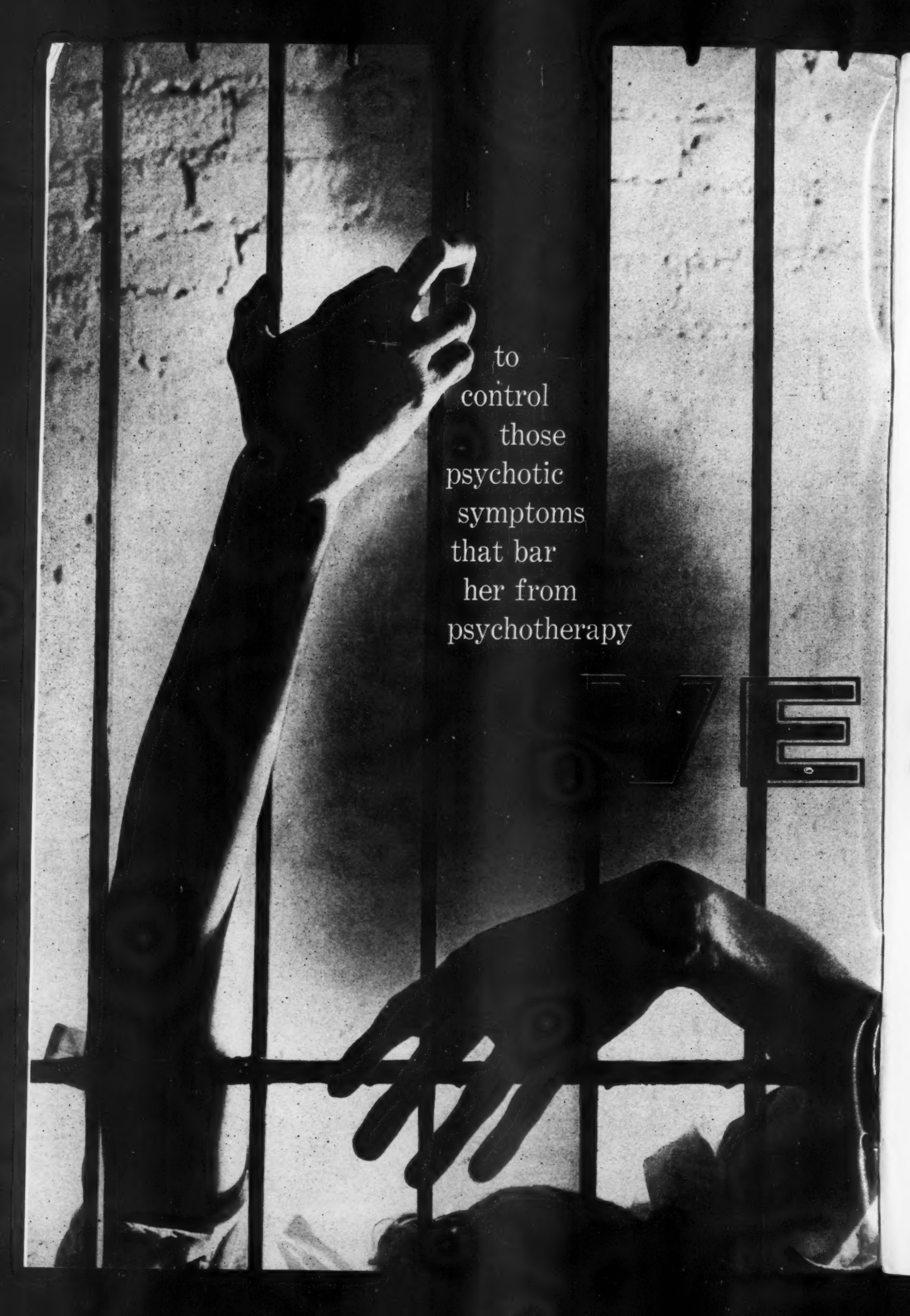
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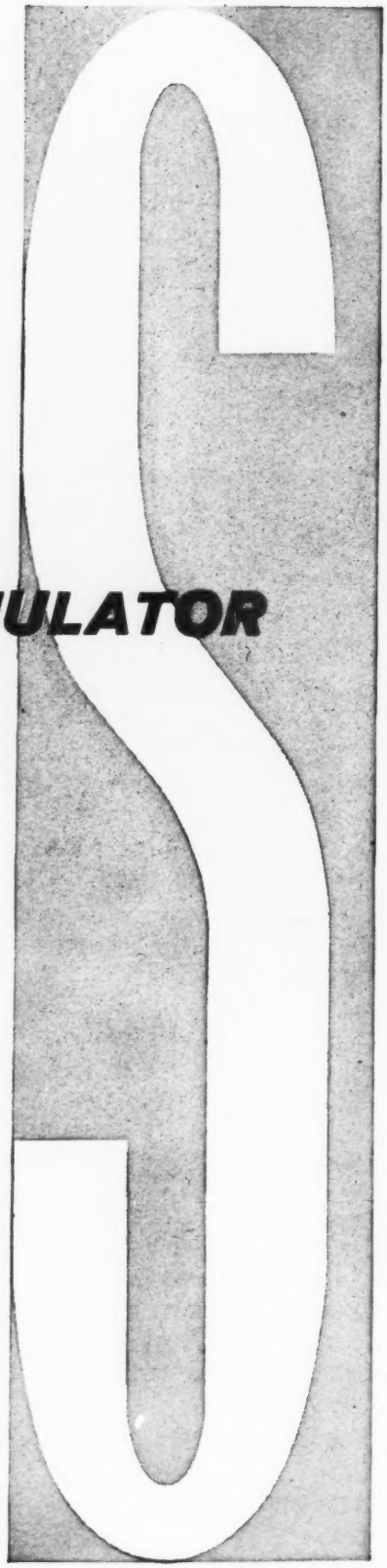

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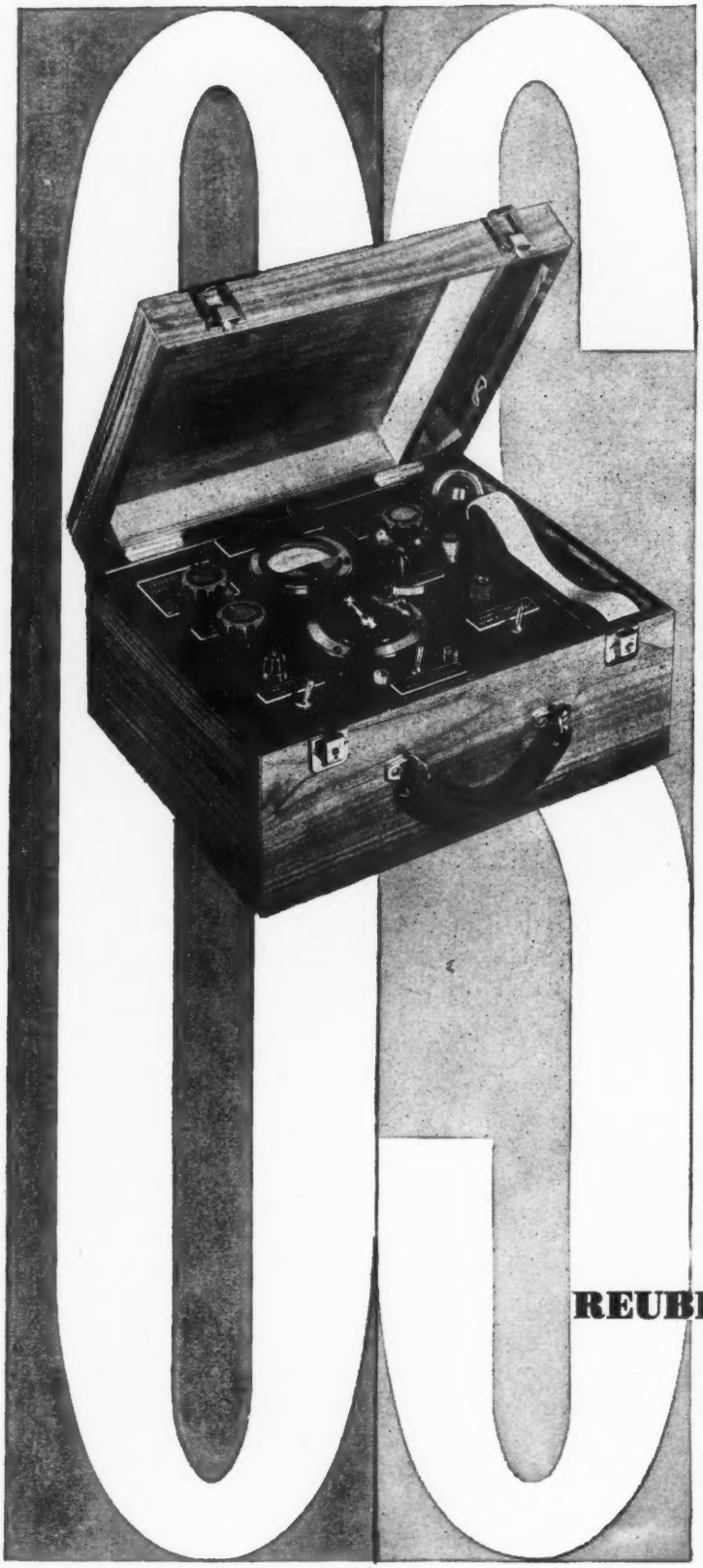

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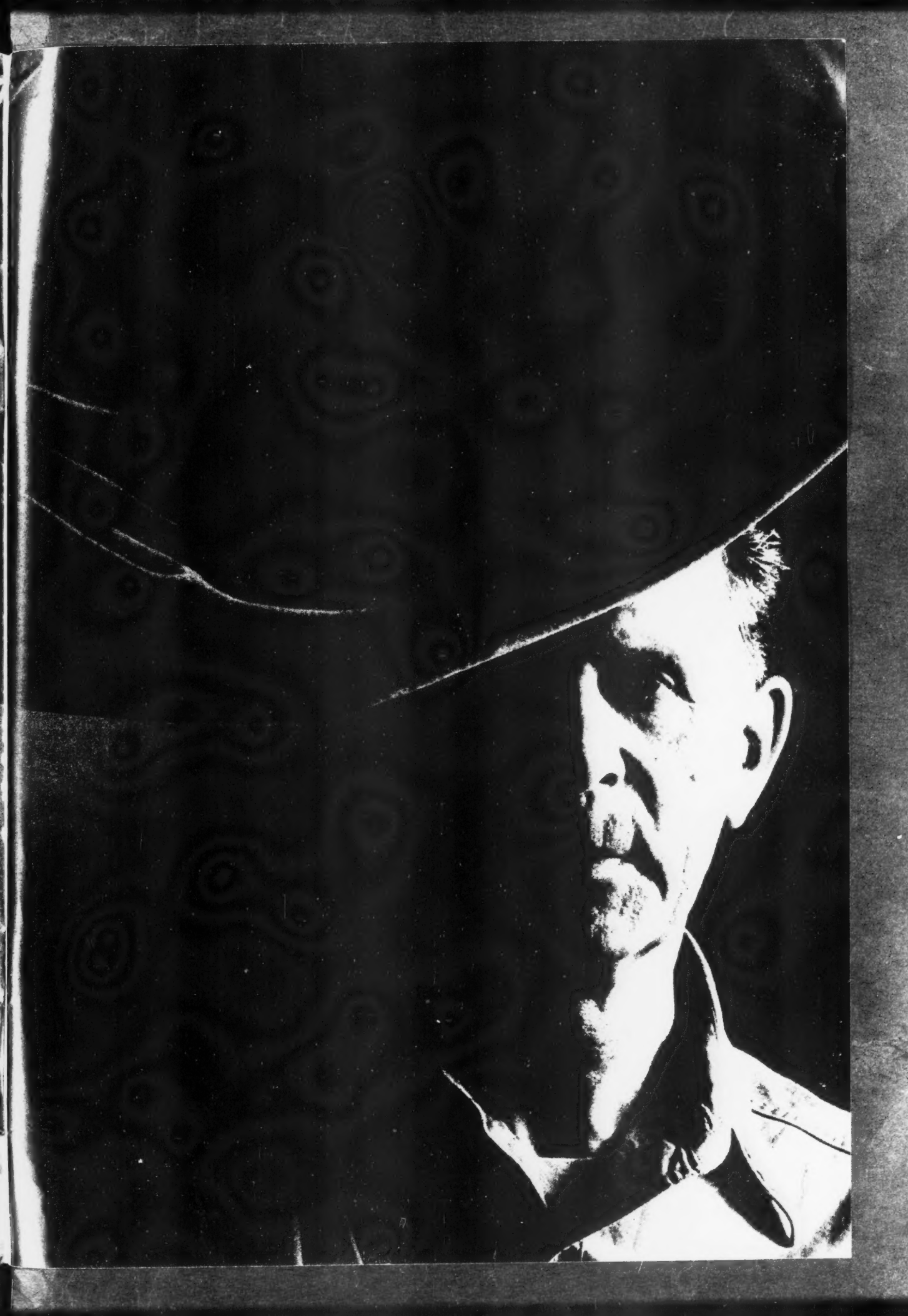

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'Stelazine' dosage must be adjusted to the severity of the condition and to the response of the individual. Dosage should be titrated carefully in order to achieve maximum therapeutic effect with the lowest possible dose.

'Stelazine' is intended for use only in patients who are either hospitalized or under adequate supervision. As yet, dosage has not been established for children under 12 years of age.

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The usual starting dose is 2 mg. t.i.d., but many patients can be started satisfactorily on 5 mg. b.i.d. (Small or emaciated patients should always be started on the lower dosage.)

The majority of patients will show optimum response on 5 mg. t.i.d. or 10 mg. b.i.d., although a few may require 30 mg. a day or more. Optimum therapeutic dosage levels should be reached within 2 or 3 weeks after the start of therapy.

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Intramuscular (for rapid control within hours)

The usual dose is 1 mg. to 2 mg. (½ cc.–1 cc.) by deep intramuscular injection every 4 to 6 hours, as needed. More than 6 mg. within 24 hours is rarely necessary. As soon as a satisfactory response is observed, oral medication should be substituted at the same dosage level or slightly higher. If motor restlessness or jitteriness occurs, the dosage should *not* be increased. See "Side Effects" below.

Only in very exceptional cases should dosage of 'Stelazine' Injection exceed 10 mg. within a 24-hour period. Since 'Stelazine' has a relatively long duration of action, *injections should not be made at intervals of less than 4 hours* because of the possibility of an excessive cumulative effect.

'Stelazine' Injection has been exceptionally well tolerated; pain and induration at the site of injection have not been reported.

SIDE EFFECTS

Clinical experience has shown that when side effects occur, their appearance is usually restricted to the first 2 or 3 weeks of therapy. After this initial period, they appear infrequently even in the course of prolonged therapy. Termination of 'Stelazine' therapy because of side effects is rarely necessary.

Extrapyramidal symptoms

Extrapyramidal symptoms are seen in a significant number of patients given 'Stelazine'. These symptoms may resemble Parkinsonism or be of the dystonic type. The muscles of the face and shoulder girdle may be selectively involved. Symptoms observed have included: spasm of the neck muscles, extensor rigidity of back muscles, carpopedal spasm, oculogyric crisis, trismus and swallowing difficulty. Occasionally, there may be elements of excitement and increased suggestibility.

Despite some similarity to symptoms of serious neurologic disorders, these extrapyramidal symptoms are reversible. They subside gradually—usually within 24 to 48 hours—when dosage is lowered or the drug temporarily discontinued. If desired, they may be more promptly controlled by the concomitant administration of anti-Parkinsonism agents. Severe dystonia has responded rapidly to intravenous caffeine sodium benzoate.

Akathisia (motor restlessness and turbulence)

Some patients may experience an initial transient period of stimulation or jitteriness, chiefly characterized by motor restlessness and sometimes insomnia. These patients should be reassured that this effect is temporary and will disappear spontaneously. If this turbulent phase becomes too troublesome, reduction of dosage or the concomitant administration of small doses of phenobarbital or some other mild sedative may be helpful.

At times, this effect may be strikingly similar to the original anxiety manifestations of the psychosis. Thus, it is important to identify these symptoms as a side effect, and to see to it that the dosage of 'Stelazine' is *not* increased until these symptoms have disappeared.

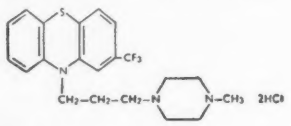
Others

Other side effects have been minor. Drowsiness has occurred but has been transient, usually disappearing in a day or two. There have been occasional cases of dizziness, muscular weakness, anorexia, rash, lactation and blurred vision.

'Stelazine' is contraindicated in comatose states. For further information, see the S.K.F. literature.

CHEMISTRY

'Stelazine' is 10-[3-(1-methyl-4-piperazinyl)-propyl]-2-trifluoromethylphenothiazine dihydrochloride.



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REFERENCES 1. Feldman, P.E.: An Evaluation of Trifluoperazine in Chronic Schizophrenia, in Trifluoperazine: Clinical and Pharmacological Aspects, Philadelphia, Lea & Febiger, 1958, pp. 87-97. 2. Goldman, D.: Clinical Experience with Trifluoperazine: Treatment of Psychotic States, *ibid.*, pp. 71-86. 3. Markey, H.: Patients with Chronic Schizophrenic Reactions Treated with Trifluoperazine, *ibid.*, pp. 150-155. 4. Kovitz, B.: Management of Psychotic Tension Symptoms with Trifluoperazine: A Preliminary Report, *ibid.*, pp. 144-149.5. Brooks, G.W.: Definitive Ataractic Therapy in the Rehabilitation of Chronic Schizophrenic Patients: A Preliminary Report on the Use of Trifluoperazine, *ibid.*, pp. 54-61. 6. Rudy, L.H.; Rinaldi, F.; Costa, E.; Himwich, H.E.; Tuteur, W., and Glotzer, J.: The Use of Trifluoperazine in the Treatment of Acute and Chronic Psychotic Patients, *ibid.*, pp. 125-137. 7. Freyhan, F.A.: Occurrence and Management of Extrapyramidal Syndromes in Psychiatric Treatment with Trifluoperazine, *ibid.*, pp. 195-205. 8. Kinross-Wright, V.J.: Trifluoperazine and Schizophrenia, *ibid.*, pp.62-70. 9. Gunn, D.R.: The Role of Trifluoperazine in the Treatment of Refractory Mental Patients, *ibid.*, pp. 47-53.

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References:
1. Bowes, H. A.: Am. J. Psychiat. *113*:530 (Dec.) 1956.
2. Bruckman, N., *et al.*: Am. J. Psychiat. *114*:262 (Oct.) 1957.
3. MacGregor, J. M.: South African M. J. *30*:1108 (Nov. 17) 1956. 4. Sarwer-Foner, G. J., and Koranyi, E. K.: Canad. M. A. J. 77:450 (Sept. 1) 1957

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1. Alexander, L.: Chemotherapy of depression—Use of meprobamate combined with benactyzine (2-diethylaminoethyl benzilate) hydrochloride. J.A.M.A. 166:1019, March 1, 1958. 2. Current personal communications; in the files of Wallace Laboratories.

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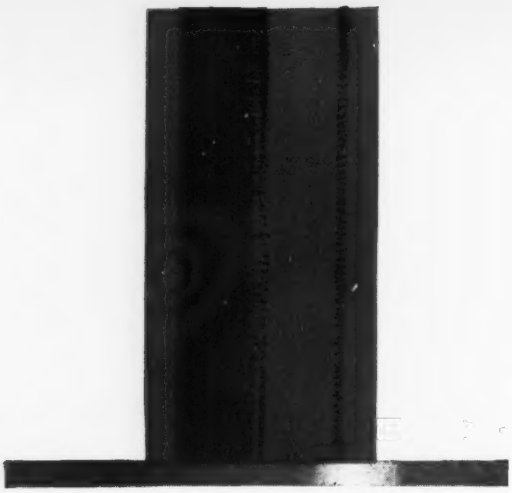

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1. Wilcox, F.: Dis. Nerv. System *19:*104 (Apr.) 1958.

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DISEASES *of the* Nervous System

A PRACTICAL JOURNAL ON PSYCHIATRY AND NEUROLOGY

Symbolic Language Discrimination in Psychomotor Epilepsy

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ALICE CALVERT ROBERTS, SC.D.

That the brain-damaged show a loss of ability to deal with abstract tests of a visio-spacial nature is widely accepted among psychologists. This loss has been contrasted with the brain-damaged individual's generally good performance in vocabulary. Since Berger's first publication in 1929,[1] many reports have appeared concerning the relation of human brain potentials to psychology. These have been thoroughly reviewed by Knott,[2] Lindsley,[3] and Kennard.[4]

Because the early workers in the field had few channels on their machines, and since these were usually employed to study the occipital areas, it followed that the workers should be preoccupied with the most obvious rhythm in that area, the alpha rhythm. In particular the alpha frequency and alpha index were studied. When psychometric correlations were attempted with these functions of alpha, the Binet type of test was employed so that the resulting attempts at correlation were usually between I.Q. and alpha index or frequency.

Most studies were done on normals. Notable on deficients were studies by Kreezer on Mongoloids[5] and on adult non-differentiated familial type deficients.[6] This last study by Kreezer and one by Knott, Friedman and Bardsley[7] on an intellectually heterogeneous group of eight year olds, which could not be confirmed in a similar group of twelve year olds, are the only studies exhibiting even a slight positive correlation between alpha frequency and intelligence, although numerous such correlations have been attempted.

A few electroencephalographic investigations were concerned with intelligence tests other than the Binet. Greenblatt et al.[8] used a battery of abstract tests consisting of Goldstein's modification of Kohs block designs, Weigl formcolor sorting, color sorting with Holmgren yarns, and Shipley abstraction test. These authors did not try to analyze the type of performance or the cortical areas involved in the battery of tests, but rather considered the general performance of the subject on all the tests. They divided their results into five groups to give quantitative values to performance on these tests and then compared these divisions with similar quantitative assessment of the "quality" of the EEG. While there were many discrepancies, there was a pronounced correlation between abstraction ability and abnormal EEG's and other signs of impairment.

Shagras[9] attempted to correlate occipital alpha frequency and performance on the classification test given U.S. Aircrew candidates. He found no significant difference between alpha frequency and the scores on these tests of mental ability.

Hill,[10] in examining the EEG in episodic behavior disorder refers to Dr. Henry Rey's unpublished work, which employed the Mill Hill Vocabulary and the Raven Progressive Matrices. He said, "It is those schizophrenics with paroxysmal EEG abnormalities and only those schizophrenics, who, as a group, show the significant tendency to verbal-non-verbal discrepancy on intelligence tests." He found their verbal scores lower than their non-verbal scores.

However, none of this early work analyzed the relation of the loss to the area of the cortex involved. Recently, by locating

From Consultation Clinic for Epilepsy, Neuropsychiatric Institute College of Medicine, U. of Illinois, Chicago, Ill.

the affected area electroencephalographically by records made in the Gibbs' laboratory it has been shown by Roberts[11] that the performance on the Raven Progressive Matrices by patients with temporal lobe disorder (as evidenced by spike foci in the electroencephalogram) was at least as good as that of a normal population, and performance of the Raven Progressive Matrices test by patients with bi-occipital disorder (as evidenced by spike foci in the electroencephalogram) was far below that of a normal population.

The bi-occipital group thus fell into the classical pattern of brain damage with extremely limited ability in solving the abstract visio-spacial problems of the *Raven,* but often with considerable and obvious capacity in vocabulary. However, the psychomotor epileptics usually reverse this pattern, as Ray indicated his "schizophrenics with epilepsy" also did. Since our original study did not utilize vocabulary material in such a way that the performance in vocabulary of the patients with temporal lobe disorder could be compared directly with their ability on abstract tests, the present investigation has been carried out in order to make this comparison quantitative. Any part of the cortex may be the site of focal seizure activity. When such a focus is evident in the electroencephalograms it indicates some degree of injury. However, such injury is not necessarily associated with a gross or microscopic lesion. It may be, and often is, a submicroscopic or molecular derangement. Such derangements are at times more disturbing than a structural lesion.

Material and Methods

Patients were chosen at random from the epilepsy clinic on the basis of electroencephalograms which showed disorder in the temporal lobe either on the right or left side. These records had all been made previously in the Gibbs' laboratories and the readings confirmed by Dr. or Mrs. Gibbs. Moreover, the patients had also been diagnosed as psychomotor epileptics by one of the clinicians who saw them in the epilepsy clinic.

In the case of the temporal lobectomies the same procedure had been followed in regard to diagnosis before the operation. The damage to the temporal lobe was converted to a gross structural defect when temporal lobectomy was performed.

The Raven Progressive Matrices[12] and the Mill Hill Vocabulary Scale[13] have been standardized over a wide age range (5 to 56) by *Raven* on thousands of normal subjects. The *Raven* test has been studied and evaluated in the Thurstone Laboratories at the University of Chicago for certain factors related to intelligence by H. J. A. Rimoldi. He finds factors of space and perception and speed as well as other psychological activities which make up mental abilities. He hints that some factors may represent the ability to deal with symbols.[14]

The *Raven* and *Mill Hill* tests are scored as follows:

GRADE I—"Intellectually superior" if the score lies at or above the 95th percentile for the subject's age group.

GRADE II—"Definitely above average in intellectual capacity" if the score lies at or above the 75th percantile.

GRADE III—"Intellectually average" if the score lies between the 25th and 75th percentile.

GRADE IV—"Definitely below average in intellectual capacity" if the score lies at or below the 25th percentile.

GRADE V—"Intellectually defective" if the score lies at or below the 25th percentile.

Results

(Scored as percentile grades where I represents the highest score and V the lowest.)

Psychomotor Epilepsy (left)

	Raven	*Vocabulary*
L.S.	III+	III—
K.O'C.	V—	III—
S.J.	III	V
B.C.	II—	V
R.B.	III	III—
J.B.	III—	III—
R.M.	II—	IV
M.D.S.	III—	III—
V.W.	III—	IV+
R.S.	III+	III—

Of these ten cases (left psychomotor) only one showed a lower *Raven* than vocabulary score. Not one tested higher than "low average" in vocabulary, while four were definitely below average and two were in Group V (intellectually defective).

Psychomotor Epilepsy (right)

	Raven	*Vocabulary*
F.F.	III	V—
F.G.	III—	IV+
J.B.	V—	III—
K.M.	III—	III—
J.B.	II—	IV
L.S.	I	III
N.C.	III	IV+
D.S.	III+	III
L.F.	III+	IV+
R.W.	III—	IV+

Of these ten cases (right psychomotor) only one showed a lower *Raven* than vocabulary score. In vocabulary only two were "average," six were definitely below average, and one was in Group V (intellectually defective).

Temporal Lobectomy (right or left)

	Raven	*Vocabulary*
J.C.	I+	III
I.M.	III	III—
A.M.	III	III—
L.KK.	III—	III+
D.P.	IV—	IV
G.K.	III—	V
H.S.	III+	III—
R.W.	III+	IV
L.E.	III	IV
C.S.	III—	III

Only three out of ten of these cases followed the classical pattern of brain damage in having a vocabulary which was higher than abstract ability. In vocabulary one was a high average, two were average, three were low average, four were definitely below average, and one was intellectually defective.

Discussion

Language and the Electroencephalogram

The language problem in general has not been thoroughly resolved in spite of the efforts of many capable workers from the fields of neurology, physiology, and psychology. These efforts have not localized with certainty the areas of the brain chiefly involved in specific symbolic functioning. Further progress requires some correlation of the finding of the various disciplines, but it is no simple matter to bring together data collected with diverse techniques and to explore the sometimes converging but often diverging interests of investigators from different fields.

It has been said that evidence for "the speech center" as postulated by Broca was based upon the findings in a single case which showed far more pathology than that which involved the "speech area." Motor and sensory cortical mappings have been done but some of this work (auditory) has util-

Fig. 1. Left anterior temporal—mid temporal foci. *All to right ear*

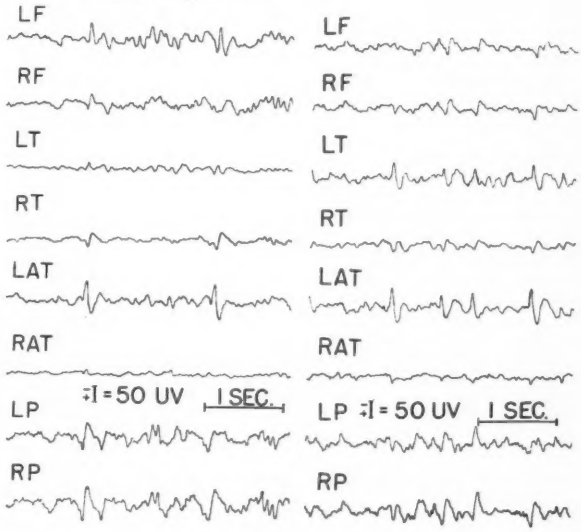
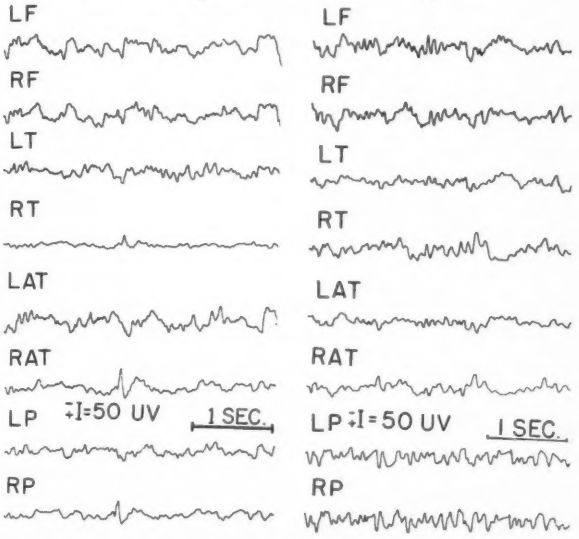


Fig. 2. Right anterior temporal—mid temporal foci. *All to occipital* *All to left ear*



The letters on the left hand side of the records indicate the placement of the leads (LF—left frontal, RF—right frontal, LT—left mid-temporal, RT—right mid-temporal, LAT—left anterior temporal, RAT—right anterior temporal, LP—left parietal, RP—right parietal). In each tracing the typical spike or spike and wave found in anterior temporal—temporal lobe disorder associated with psychomotor epilepsy, appears. The disturbance may spread to other areas (as the frontal) but the spike of highest magnitude (voltage) occurs in the anterior temporal lead.

Two cases from each category of left (Fig. 1) and right (Fig. 2) sided anterior temporal focus are reproduced. Figure 1 shows the left foci and figure 2 the right foci.

THE LANGUAGE PROBLEM

(Normal)

Receptive	Central (Brain)	Expressive
Auditory Visual		Reading Speech Writing

APHASIA

(Pathology of Symbolic Functioning Resulting From Brain Damage)

Receptive (Cortical Perception)	Central (Cortex)	Expressive
	Amnesia and fading Emotional and psychological set Association	
Visual Agnosia Auditory Agnosia		Alexia Aphasia
Finger Agnosia		Agraphia Apraxia

Figure 3

ized animals which do not have a cortical counterpart for man's symbolic abilities. It has not been feasible, of course, by most methods used on animals by the physiologist to explore the living cortex of man. However, there is a technique by means of which it is possible to explore the outer convexity of the cerebral hemispheres, a technique which has no damaging effects whatsoever on the subject and which is appropriate for the exploration of the normal (control) as well as the pathological. This technique, electroencephalography, has been employed in this work. Granted the localizations are gross and cannot be pinpointed to a small local area, nevertheless, by means of various patterns, well known to the electroencephalographer, large areas can be demarcated.

Experience in correlating thousands of normal records with EEG findings in individuals free from neuro-pathological findings has established standards or bases from which the abnormal can be read. Just as most of us cannot pick up an X-ray and make accurate readings, but must rely upon a specialist, similarly it becomes necessary to rely on those skilled in the art of reading electroencephalograms in order to use this new and important technique. Such specialists are not new to medicine or science.

Figure 3 shows a simple plan of the language problem. The language pathways follow the form of a reflex arc

(a) Receptive: The *inward pathway* consisting of a receptor organ leading by way of afferent paths to the

(b) Central: *Central unit* (in this case the cortex) to

(c) Expressive: The *outward path* leading along afferent pathways to the peripheral effectors.

However, the pathology of the language function with which we are concerned is related only to the central portion of this arc which is located in the cortex. Here again the function may be considered in three parts: (a) Reception may be poor, (b) the central functioning may be disturbed, or (c) the expressive functioning may be affected. Any one or all three of these parts of the arc may function pathologically. Perhaps the receptive disturbance with which we are concerned should not be termed an agnosia. It seems limited to much more specific function, the intellectual factor of visuo-spacial perception. The role, for us, of the electroencephalogram is to locate grossly the areas of brain disorder. Other techniques such as psychological tests further the study of what receptive, expressive, and mental abilities are involved.

Psychological

This work was undertaken to gain a quantitative picture of the relation between the abstract (visio-spacial) and vocabulary ability of the psychomotor patients who show electroencephalographic disorder in the temporal lobe as well as those on whom temporal lobectomies had been performed. Rey[10] had noticed that "Schizophrenics with epilepsy, and only those schizophrenics," showed a higher non-verbal than verbal score. All three of our groups showed this same pattern and it is probable that Rey's group of patients identify with these anterior temporal-temporal lobe cases (psychomotor epilepsy). Many of our patients who fall into this category have schizoid or paranoidal personalities as well as other behavioral symptoms.

When one spends much time with these patients, he finds them easily confused by words which sound somewhat similar. The patient's difficulty may lie either in the auditory perception of symbolic language or in the ideational concept of internalized language (central) or in both areas. These pa-

tients have a tendency to hear another word from the one offered and frequently this substituted word has an emotional content. One patient described his predicament thus: "With my hearing aid turned up I hear every word but can't understand them." Or a young patient expresses the feeling, "I don't like hard words." In both instances these patients had inner language and the ability to express it; their lack was receptive. Audiometric studies have indicated little or no "hearing loss." Since the loss in these areas is greater in vocabulary than in visio-spacial abstraction, vocabulary can no longer be used as the frame of reference as has previously been accepted by many psychologists. The loss in vocabulary may be the only loss showing in this test material, so that the Raven score may be the frame of reference that should be considered in these cases.

The great mass of literature concerning the physiology of hearing has of necessity been done on animals. However, the study of the physiological-psychological achievements and deficits of man cannot be carried over in its entirety from work on animals, for man has developed a much larger cortex than animals in the course of evolution, as well as ability in language perception. The function of this cortical increase seems distinctly and singularly related to symbolic language and to certain abstract ability which animals do not have. This field is represented pathologically by the many facets of aphasia, which by definition is language disorder related to brain damage. It is believed that a rough mapping of the faculty functioning of the cortex, located by means of a seizure activity in the electroencephalogram, is in order. In a broad sense this becomes the study of the individual's ability to communicate and is related to man's cortical achievement over animals.

The inferior vocabulary performance may be due to some extent to the central distortion or preoccupation these individuals tend to have, which in some instances may be attributed to a competing for attention of stimuli from within, which may or may not reach the proportions of emotional block or hallucinations. These patients do hear, but in regard to symbolic language they frequently seem to be lacking in a high degree of perceptual discrimination. This falls into the category of receptive aphasia. Walker asks why some individuals after temporal operation do not follow radio programs.[15] This faulty auditory perception related to language inadequacy would seem sufficient to explain their inattention.

The psychologist has attempted to analyze "higher" auditory function by means of melodic pattern.[16] The intricacies of such studies offer complications for most subjects and again are concerned with pure tones which do not bring into play all the intellectual mechanisms involved in language reception and expression. Working mainly on animals, the physiologist has followed neural tracts for sound from the cochlea to the cortex where gross localization occurs, not limited to a small point but spread over bands. There is a "clear separation of the cortical areas for the basal and apical ends of the cochlea." Ipsilateral and contralateral representation in the cortex from the cochlea appear to be equal.[17] Those working with human subjects in aphasia have been aware of the lowering of language discrimination in some brain-damaged individuals. When interpreting from such various fields, one needs to recognize that higher cortical development and language development go hand in hand and are characteristically different in man and in animals. Therefore, the loss due to temporal lobe damage in man may be a loss of discrimination in symbolic language, not a tonal loss or deafness. Jasper has reported that he has known of one individual gifted with exact pitch who retained it after temporal lobectomy.[18] In persons in whom hearing is disturbed there may be a distortion of sound rather than a loss of hearing, just as in cases of bilateral occipital damage the patient's visual perception may be distorted though he is not blind and as a result he may match, repeatedly, horizontal with vertical lines. Similarly, there is no reason to expect deafness or lack of hearing to be a purely cortical phenomenon which would find expression in the electroencephalogram. The pathology of cortical hearing may be a receptive aphasia or a distortion, not necessarily an absence of the language function.

So much for the receptive phase. On the

expressive side the tendency is toward stereotyped, unembroidered expression. Occasionally a patient performs far more successfully in initiating internally what he wishes to say than in answering questions involving the acceptance of auditory stimuli. One patient could not seem to understand that I wished him to name his middle fingers as left or right. At last after much cogitation on his part and explanation by me, he said, "Oh, you mean left or right like my arms." He had seemed so lacking in understanding of this very simple concept that I was amazed when he re-entered my office later and expressed simply and directly a wish of his own, "Is it all right if I smoke?"

Another patient called his clinician and said he could not get the idea of doing away with himself out of his head. The clinician's response using the word "suicide" was immediately rejected by the patient. It took a lengthy discussion to get him to understand that the two expressions were synonymous. Small wonder these patients have a frequently expressed need to "talk things out" and are seldom self-limiting in their interviews. It is believed that such language inadequacy and distortion show up psychometrically on the vocabulary scale we have employed in these studies.

In contrast to the unhappy emotion often expressed concerning words and vocabulary these patients frequently perform happily and attentively on the Raven. They may express appreciation for an hour of distraction from their confusing and mixed-up thoughts. It was suggested that their good response might be due to the attention they were receiving from the interviewer. Subsequently, these people were allowed to work on the *Raven* with no one present in the room, with similar response. It is suggested that absorbing, abstract work of a visual nature not involving language might be of therapeutic value to these specific cases. These people also may find an occupation limited to such paper work more possible for them than one constantly demanding auditory language discrimination and response.

Since Rimoldi's factoral study of the items of the Raven is extensive and thorough concerning the varied mental abilities which are involved in the Raven tests, it is hoped that a more extensive study of the divisions of the test correlated with items failed by groups of patients with pathology in different areas, will produce more specific information concerning their failures.

Summary and Conclusions

(1) Patients with psychomotor epilepsy follow the psychological pattern of Rey's "Schizophrenics with Epilepsy" (higher abstract ability than vocabulary rating) rather than the classical pattern of brain damage (higher vocabulary than abstract ability).

(2) This is true whether spike seizure activity in the anterior temporal-temporal area is taken as the criterion of brain damage or whether the damage has been made absolute by temporal lobectomy.

(3) The loss seems to be related, at least in part, to a mild receptive aphasia.

Acknowledgments: I should like to acknowledge my appreciation: To Dr. and Mrs. Frederic A. Gibbs for their help with this paper and for supplying all the necessary records for this study. To Dr. Frederick W. Stamps for supplying the cases which made this study possible and for his suggestions and criticism throughout its course.

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The Psychodynamics of Filicide and Matricide

EDWARD PODOLSKY, M.D.

Child murder by parents is an act with diverse motives; there are complex underlying drives which lead to the act. Predominantly the filicide is committed by the mother and poison is the means most frequently used. Suffocation, strangulation and infliction of fractures and wounds to the skull are also frequent methods.

In many cases filicide is a suicidal act as a result of identification processes. In psychiatric examinations it is often developed that the filicide was not primarily an expression of conscious or unconscious hatred against the child. In both schizophrenia and in manic depressive psychotics there is a tendency for mothers, especially, to project their symptoms onto their children so that the child becomes analogous to an organ in the mother's body. What may first be a suicidal drive gradually may be converted into a tendency to kill both herself and her child. After this the mother may actually feel relieved of the symptoms which she believes she has destroyed in the child. In processes where there is less dissociation the tendency may be merely to seek peace for the whole family. Such cases may represent an attempt to escape from the turmoil of life, either real or fancied, and the child becomes an integral part of the escaping personality. The suicidal urge may be incompletely successful and therefore lead to murder. Some aggressive tendencies against the child may also be present as in the case of the unhappily married mother who lost a first child through possible neglect, had a second child with her lover and attempted suicide with the third. These are some of the psychological mechanisms that may lead to an act of filicide.

In a series of cases of infanticide and filicide, McDermaid and Winkler discuss some common motivations and prompting impulses. They classify the cases into four major groups: social pressure, psychotics, postpartum psychosis and impulse disorder with tension state.

In many cases social pressure prompts the filicide. The number of unmarried girls who try to dispose of their new born infants in order to escape public attention is large. Wertham states: "In most cases of infanticide the heaviest responsibility is not intrapersonal, but lies in adverse social circumstances which counteract the development of expression of normal maternal feelings." States Margaret Mead: "The mother's nurturing tie is apparently so deeply rooted in actual biologic conditions of conception and gestation, birth and suckling, that only fairly complicated social arrangements could break it down completely."

According to McDermaid and Winkler that except in a group for which social conditions are unbearable, as in the case of young unmarried mothers, social pressures are not the essential factors in the causation of filicide. In psychotic cases, there is an emotional blunting in the schizophrenic process which leads to the act of filicide. There may be auditory hallucinations which command the death of the child. Projection of feelings onto the child may also occur, and the child becomes the object of marked

hostility, and as such is removed in an attempt to obtain relief from these feelings. Suicide often occurs after the child has been disposed of. Compulsivity is another quite prominent factor in these cases of filicide.

Post partum psychosis is frequently associated with suicidal tendencies which simultaneously endangers the life of the newborn child. Anxiety and a resultant depression, with symptoms of unreality, and disorganization of the personality may lead to destruction of the infant.

According to McDermaid and Winkler, child centered obsessional depression often results in infanticide and filicide. There are certain definite characteristics present in this condition, e.g., infanticidal action without any obvious precipitating factors, long standing tension state, depression with suicidal tendency and self-derogatory trends, obsessional pre-occupation with the health of the child, and difficulty in the parental home situation.

The unpredictability of infanticide and filicide, and that the background is usually of a complex nature indicates a short-circuited reaction. Kretschmer describes three kinds of primitive reactions—hysteric, explosive, and the short-circuited. According to his theory, an excessively strong experience stimulus breaks through and paralyzes the highest levels of the personality concerned with deliberate planning. The lower phylogenetic levels of the psyche are stimulated separately. Even a healthy adult may sometimes exhibit such syndromes in response to the experience of excessive shock. In arrested or inhibited psychic development, psychopathic conditions and schizophrenia, the experience stimulus need not be exceptionally strong. Short-circuited reactions differ from explosive reactions in that they involve complex actions whereas in explosive reactions there is a primitive motor discharges. Kretschmer mentions that infanticide by unmarried mothers is for the most part a typical short-circuited reaction. This reaction may be accompanied by a clouding of consciousness, or it may be accomplished after the fashion of normal actions with deliberation, foresight, skill and full consciousness.

There are two types of reactions to the murder on the part of the parent who has committed the deed. Usually each individual may show some combination of the two reactions. First there is increase in the symptoms which the individual already has and which lead him to perform the deed and in such a way as to denote a depression, such as stupor. This reaction is in some way a punishment for the deed. It is often initiated with a twilight state expressing bewilderment, ideas of punishment and death, and a denial of the identity of the individual and also of the deed. There is usually a conscious amnesia for the deed, associated, however, with evidence of conscious knowledge of it. Following this reaction, there is a tendency in some cases to recover from the symptoms that led to the murder.

Matricide is a type of homicide which has proved an interesting problem to psychiatrists. Mother killers are rather young, between fifteen and the middle or late twenties. They are usually intelligent with no history of juvenile delinquency. They had been, until the time of the murder, apparently normal and well-adjusted young men. They had shown no anti-social tendencies and they were apt to be hypermoral rather than amoral. For the murder they use knives, hammers, hatchets, guns, but never poison. Frequently they are excessively attached to their mother and are unusually fond of her. They show little interest in the other sex. The act of murder seems always to spring from an apparently trivial cause. Sometimes before the murder, the son attempts to suppress the impulse to kill, but without success.

After the murder, the psychological pictures vary. Concealment of the deed is apt to be perfunctory and usually a full confession is made. Nearly always the murder takes place in the mother's bedroom. Some of the young murderers seem to have no feeling of guilt at all. They show no emotion. Others, going to the opposite extreme, indulge in serious self-castigation and remorse. It is Frederic Wertham's thesis that excessive attachment to the mother can be transformed directly into violent hostility. Hostility against the mother is usually explained as secondary and derived from hostility against the father.

Wertham, in his very interesting book, "Dark Legend," describes a matricide by a 17 year old Italian boy. Following his father's death, which occurred while he was 10 years old, Gino and his younger brother and sisters were ill-treated by the mother who beat them and neglected to provide food, while she prostituted herself with various men. Resentment of her behavior built up to such a point that one day, when he was 12 years old, he made a vow that his right hand must be cut off at the wrist if he did not kill her one day. However, five years were to elapse between the oath and the actual killing, during which time the gradually mounting hatred was concealed by a friendly, outgoing attitude. His hard work, good behavior and puritan morals caused him to be liked by everybody in the neighborhood. Only during the last month before the murder did any personality change become apparent. At this time he began coming late to work, having been unable to sleep at night. He was pre-occupied and absent-minded, whereas formerly he had been punctual and reliable. He was unable to eat. He became morose and no longer liked to listen to the radio. The reason for this was that he was completely obsessed with the need to commit the murder, for which he had long formulated definite plans. These included getting his mother to sharpen the bread knife with which he later killed her. After the murder, in which he stabbed his mother 32 times, Gino experienced a state of calm and a complete absence of feelings of remorse. For the first time in months he was able to sleep and he again became his friendly, affable self. His first thought after the murder was to buy some candy for his younger brother and sisters to keep them from crying. He justified the killing by the statement that his mother had "dishonored the family." After years in a mental hospital he came to have some insight into the enormity of his act.

Wertham has applied the term catathymic crisis to the mechanism underlying matricide. The central idea is that a violent act must be committed accompanied by a tremendous urge to carry it out. The plan itself meets so much resistance in the individual's mind that he is apt to hesitate and delay. The violent climax is reached as a direct result of the intolerable inner tension. There is usually little or no provocation. The individual's thinking may have delusional character in its rigidity and inaccessibility to logical reasoning. The violent act itself has a symbolic significance over and above its obvious meaning.

The clinical development may be as follows: An injurious life experience precipitates an unbearable and seemingly insoluble inner situation leading to persistent and increasing emotional tension. The individual holds the outer situation entirely responsible for his inner tension. His thinking becomes more and more self-centered. With apparent suddenness crystallization is reached in the idea that some violent act against another person or against himself is the only way out. After a prolonged inner struggle leading finally to extreme emotional tension, this violent act is carried out or attempted. It is followed immediately by an almost complete removal of the preceding emotional tension, but the individual does not gain insight at this time. There follows a superficially normal period of varying lengths. During this time the complex-determined thought of the individual makes him still see the need for the violent act in a wrong light. Finally an inner equilibrium is reestablished which leads to insight. It then becomes clear to him that the outer situation with which he was faced after the initial traumatic experience does not sufficiently account for the violent act committed, and that this act satisfied a deep inner need he had not been aware of. He realizes that the motives for the violent act with which he has credited himself was not the real driving power.

According to Wertham, there are five distinct stages in the progress of a case of catathymic crisis:

1. Initial thinking disorder.
2. Crystallization of a plan.
3. Extreme tension culminating in the violent crisis.
4. Superficial normality.
5. Insight and recovery.

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The Mode of Action of Taraxein and LSD

B. MELANDER and S. MARTENS

Taraxein is the name adopted by Heath, et al.[1,2,3] for a principle of schizophrenic serum, capable of inducing a psychotic-like state in monkeys and in human volunteers with alterations in the depth EEG—especially in the hippocampus and septal region—similar to alterations found in schizophrenics. This report deals with the interaction of taraxein isolated according to Heath, et al.,[1] and of LSD with different psychotropic drugs i.a. acetylcholine, adrenaline, adrenolutin, atropine, mescaline, serotonin and a phenothiazine.

We have been able to confirm that intravenous administration to Rhesus monkeys of an amount of taraxein, isolated from 400 ml. of scrizophrenic serum, produces within 15 minutes a withdrawal pattern including catatonic features which lasts for at least half an hour. Stimulation of the animals increases the withdrawal. The phenomenon often appears in waves, interchanged with more normal behavior. Kabi 888 given intravenously to monkeys and cats at the dose level of 10-12.5 mg., corresponding to 2-3 mg./kg. causes no observable clinical changes. Heath[4] in confirmatory preliminary trials found no changes in the subcortical and cortical EEG recordings.

Apart from the experiments in which we administered taraxein alone to Rhesus monkeys, different batches of taraxein were given prior to Kabi 888. Control experiments were performed with deteriorated taraxein and with the corresponding fraction isolated from normal serum. All experiments with active taraxein gave the same clear-cut results. At the height of the taraxein effect as described above, 10 mg. of Kabi 888, corresponding to 2-3 mg./kg., were injected intravenously. There was immediate loss of muscle tone, general pilo-erection, and a deep sleep which was clinically separable from the taraxein reaction (Figure 1). These symptoms lasted for 10 to 15 minutes, followed by a return to the taraxein behavior. Deteriorated taraxein and the corresponding fraction from normal serum did not produce the typical taraxein effect. Kabi 888 given after inactive taraxein did not cause any changes like those noted when given after the injection of active taraxein. Utilizing monkeys with subcortical electrodes Heath[4] has confirmed our observations and found that Kabi 888 given intravenously subsequent to taraxein exerted a profound central activity starting in the hippocampus and the septal region.

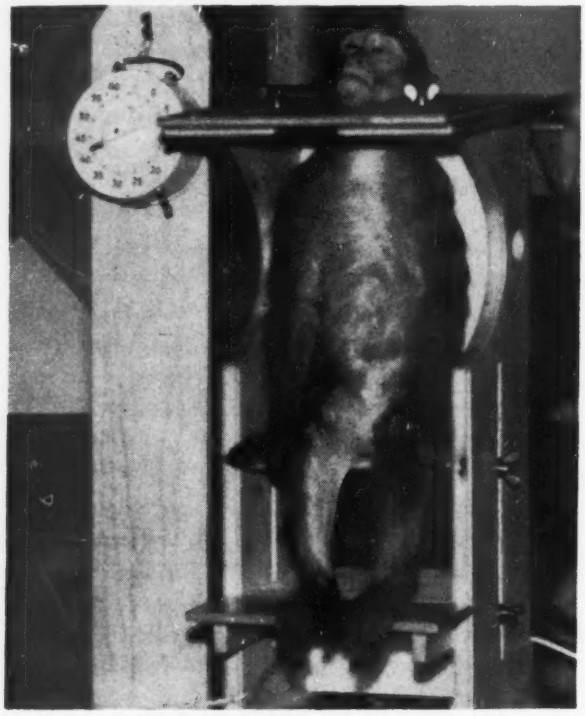

Figure 1

In order to investigate whether similarities existed between taraxein and LSD the above described experiments were repeated with LSD instead of taraxein. The same monkeys which received Kabi 888 in conjunction with taraxein were used. LSD was given intravenously in an amount of 50-100 microg., corresponding to 15-30 microg./kg. Within 15 minutes a slight withdrawal was noticeable and the monkeys became slightly catatonic.

At this stage 2-3 mg./kg. of Kabi 888

From Research Department, A/B Kabi, Stockholm and Beckomberga Hospital, Bromma, Sweden.

were given intravenously, immediately resulting in a complete loss of muscle tone, followed by a sleep-like state lasting for about 10 minutes. Half an hour later the Kabi 888 dose was repeated with the same striking effect. Heath[4] confirmed that premedication with LSD seems to enhance the central nervous system effects from Kabi 888. To judge from the EEG readings there appears, however, to be a qualitative difference in addition to a quantitative difference between taraxein plus Kabi 888 and LSD plus Kabi 888.

Hoffer[5,6] and Osmond[7] have carried out volunteer trials utilizing adrenolutin as a psychotomimetic agent. In our studies adrenolutin exerted only a slight pharmacodynamic activity when given intravenously to monkeys or cats in the dose range of 20-25 mg./kg. After premedication with taraxein or LSD, however, even as little as 2-3 mg./kg. of adrenolutin intravenously produced drowsiness and muscular relaxation. Heath[4] gave higher doses of our adrenolutin producing a stuporous state. Experiments in cats premedicated with 15-20 microg./kg. of LSD intravenously, followed by 2-3 mg./kg. intravenously of Kabi 888 or adrenolutin gave the same result as described above in monkeys. Hoffer[8] applying our technique to humans has confirmed our findings that premedication with low doses of LSD enhances the activity of adrenolutin given later.

Feldberg and Sherwood[9] and Schwarz, et al.,[10] have reported on the striking behavioral changes in cats after intraventricular administration of i.a. acetylcholine, adrenaline, adrenolutin, atropine, mescaline and serotonin. Using these drugs we carried out experiments in cats, serving as their own controls. The dose range chosen, 0.1-1 mg./kg. intravenously, produced none or only negligible clinical changes in the control experiments. After premedication with LSD the same amount of the drugs administered intravenously caused the same striking central effects.

Preliminary studies with acetyl-LSD (ALD) and bromo-LSD (BOL) given in the same dose range as LSD indicate that the above properties of LSD are found in ALD but not in BOL.[2]

Cerletti[11] summing up the pharmacodynamic properties of LSD suggests that the psychotomimetic part of the LSD effect might involve a "trigger function." Heath, et al.,[12] after a series of experiments in monkeys with taraxein followed by Kabi 888 and adrenolutin according to our technique discuss various possibilities of the mode of action of taraxein e.g. interference with amine metabolism or permeability changes of the blood-brain-barrier. Our experiments discussed above suggest that taraxein and LSD both have the property of enabling certain intravenously injected drugs to act on selected brain centers, not normally accessible to them. Endogenous compounds present in the blood might also produce behavioral changes through the same mechanism.

Authors' Note: LSD, ALD and BOL were kindly supplied by Dr. A. Cerletti of Sandoz, Basle, Switzerland.

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Cogito, Ergo Sum: Discussion of Perception, Mind, and Brain

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For many centuries the problems of perception—for they are many—have engaged the attention of thinkers, philosophers, and scientists. It is appropriate that some of this work be reviewed so that the psychologist, psychiatrist, and physiologist may determine at what points their disciplines overlap.

When a man recalls pleasure or pain to his memory, or anticipates them in his imagination, there is a difference between the perception of those sensations as they are recalled or anticipated, and the perception of them at the moment they occur. When a man recalls or anticipates them, his feelings may copy or simulate the perceptions as they occur, but can never, in a normal person have the same force or liveliness. As David Hume remarked, "the liveliest thought is inferior to the dullest sensation." It does not require the metaphysical head of a Hume, or any fine discernment, to mark this distinction common to all mental perceptions.

One can now postulate that all perceptions are divisible into two groups. The first of these consists of the less forcible, which are generally designated as thoughts or lideas. The second group consists of the livelier perceptions that occur when we see, hear, and feel. These may be termed impressions. It was thus that David Hume drew the distinction in his *Enquiry Concerning Human Understanding,* published in 1748. He did so at great length but with a minimum of ambiguity. John Locke, whom John Stuart Mill called "the unquestioned founder of analytic philosophy of mind," held that bodies are perceived with qualities not belonging to them; qualities which are, in fact, merely the creation of the mind. In this view, the world consists entirely of a characterless and featureless substance. Bishop Berkeley went a step further and eliminated substance altogether.

The thoughts of man, unfettered as they are by any authority or power, or by any restriction of nature or reality, would seem to be limitless. Imagination finds it as easy to conjure up the most bizarre objects as it does the most familiar. Closer consideration, however, would seem to contradict this hypothesis, for what are the raw materials of imagination if they are not those given to it by the senses and by experience? The utmost creative ability of the mind is then no more than the faculty—with greater or less facility—of ordering, compounding, subtracting, or adding together these raw materials. According to Hume, all our ideas, that is more feeble perceptions, are copies of our impressions, that is more lively perceptions. Hume supported this statement by recommending a subjective analysis of our thoughts or ideas, and by pointing out that a man deprived of a particular sensation by reason of a sense organ defect, was equally deprived of ideas associated with that sensation. The idea of color, for instance, is meaningless to one who is congenitally blind.

This argument is open to considerable question, of course, and this paper will confine itself merely to its presentation. One may comment that whatever its validity, the proposition has the virtue of simplicity, and its adoption would go far to eliminate much of the jargon which infests metaphysical, psychological, and scientific literature. Ideas, and especially abstract ideas, are often elusive and vaguely defined. Slender indeed is the hold of the mind upon them. They are often confused with other similar ideas. A term frequently used, if it be without a well defined meaning, may come to be imagined as having a determinate idea associated with it. Such a confounding does not occur with respect to sensations.

Such then, is the view of Hume. When we observe a star with our eyes, that star may have ceased to exist many ages before. Therefore, whatever we see, it is not the star. Bertrand Russell believed that we cannot without a preposterous kind of discontinuity

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suppose that the physiologist's percept coming at the end of a series of events, is anywhere else but in the physiologist's head.

Metaphysical hypotheses regarding the meaning of perception may be left at this point. If they do not give a complete explanation, many do at least state the problems involved.

Science has been as unequal to the task of giving an adequate picture of mental activity. Yet the physiologist too, pursuing his materialistic way, has gone some of the way in defining with more precision many of the difficulties. In doing so, he has necessarily ignored the concept of mind, and concerned himself largely with one aspect—the biochemical and biophysical problems of events in the brain at a given moment. Yet the concept of mind cannot be altogether ignored. When the brain receives a stimulus from a sense organ, and this event is followed by a muscular movement, the physiologist can explain both the stimulus and the ultimate effect—but what of the intermediate activities? He must still explain the recognition of the pattern of excitation set up by the stimulus, the memories aroused by it, the inferences drawn from it, the decisions based upon the inferences, and the emotional component of these decisions—all the events which together are perception. What is the interrelation of all these processes, and how are they themselves related to the initiating sensation, and the final product, the muscular effort? In other words, how s percieption explained?

Freud resorted to the unconscious to explain the origin of all conscious events. Our conscious thoughts, our desires, our perceptions—using that word in the widest sense—are reflections, distorted or sublimated in varying degrees, of unconscious and uncontrollable elements in our nature. They are the visible part of the iceberg.

The Gestalt school contended that an attempt to differentiate between sensory and motor elements in human experience is surely something more than a mere conversion of fused sensory events into their appropriate motor responses. It surely has a roundness, a dynamism of far greater significance.

A. D. Adrian[1] in the Waynflete lectures delivered at Oxford, does not solve this problem, but he does define the physiological and anatomical background to it. His facts and conclusions will be referred to later.

If it be so that all events occurring in the brain are unexplainable in terms of physical mechanisms, then can it be that mind must intervene, and if so, where and when does this intervention occur? Are we concerned with brain alone, or is there some other mechanism involved? It is certainly true that some animals and organisms lack a brain, and yet adapt to environmental conditions with behavior patterns which are intelligent. Can it be said that these animals and organisms have a mind?

The behaviorists, while not categorically denying the existence of mind, declare that even if it does exist, no knowledge of it is possible. Therefore, they say, let the psychologist devote his effort to a study of behavior. To do this it is required of him only that he study the sensory motor system, because behavior is always the result of stimulus-response units combining, as it were, to form a whole.

T. H. Huxley explains mental activity solely in terms of brain activity. Consciousness, he says, is nothing more than the shadow of events occurring in the brain, and as such cannot influence the body. Such a materialistic theory is a compromise between the school which denies the existence of the mind because mental activity is susceptible of explanation in terms of brain processes, and the school that holds that mind exists because some mental activities cannot be explained in terms of brain.

Others postulate that physical and psychical processes run parallel in closed series without connecting link. Two thousand years ago Ovid remarked "the mind alone cannot be exiled." Since the body always acts as a whole, is it then valid to associate mind with everything that is happening in the whole body, rather than in a single part of it—the brain? Does the mind, like Hamlet's ghost, run everywhere through the body, or does it sit aloof upon the brain? The latter appears to be the modern view.

The evidence for this needs careful scrutiny. It is a commonplace that injury to

the brain very frequently alters mental activity, but that injury to other parts of the body does not have this direct effect. Of course it is often the case that provided certain important areas avoid the injury, then the change in mental activity will be apparent only to the critical examiner. Yet it is also true that the individual, with a complete transverse lesion of his spinal cord may show no discernible alteration of mental activity, provided an adequate supply of oxygen continues to be received by his brain. Conversely, if the blood supply to the brain ceases, mental activity ends abruptly. If brain survives, therefore, mind continues to exist. The only valid conclusion is that the brain must be the seat of mind, which can abide in no other place. Brain must, in consequence, be the connecting link between mind and body. The mind is in the head, says McCulloch,[3] "because there, and only there, are hosts of possible connections to be formed as time and circumstance demand"[3] (p. 563). Many workers proceed from this point to the statement that all the phenomena of mind—of perception—are to be described in terms of the mathematical and physical sciences.

Adrian's preoccupation is to discuss what goes into the brain from the sense organs and what happens in the brain in consequence. Before describing some of his observations, it is useful and pertinent to summarize the argument of science as it has been carried to this point.

The scientist is able to describe certain events. He may describe the stimulation of a sense organ and the transmission of this stimulation to the brain. He can describe the relation between these two events. When he attempts to explain what follows the entry of the nervous event into the brain, he immediately encounters difficulties. These are difficulties associated, for instance, with the processes of learning, or of recognition, or of memory, with the material changes which may or may not take place in the brain when a new association or chain of movements is learned or acquired.

These are the difficulties which appear to be related to those activities in which the mind has played a part. Adrian admits these difficulties, but as he rightly points out, they cannot be solved until the structure, the activities, and the limitations of the conglomerate mass of cells and fibres and tissues, which is the brain, are known and understood, for the brain is the mirror of a man's environment.

All that mental activity which constitutes thought must be based on a system of nervous communication. Since such communication is mediated by measurable electrical impulses of unchanging intensity, and always consisting of the same ordered sequence of chemical and physical changes, then the system of communication, which forms the basis of thought, of what we call mind, should be a relatively simple character. One may assume further that quality of sensation must be dependent upon simple material change. It is known that impulses do differ one from another according to the type of nerve fibre conveying them, also that fibres are capable of a great variety of combinations, and that cells along different impulse pathways may vary in their chemistry.

In spite of these possibilities, there is probably little basic difference between the various sense organs or between the various pathways to the brain. Yet we see, feel, and hear; we experience mental events which are widely different, although all result from similar detectable impulses travelling in similar ways along similar nerve fibres. The difference of effect would seem to be not so much in the messages, but rather in that part of the brain receiving them. Some variety of impulse is possible. It may vary, for instance, in intensity, which is a function of frequency. Rapid changes of frequency, however, and therefore of intensity of sensation, cannot be adequately registered. An impulse may also vary in the number of fibres employed in its conveyance. This variable is also limited because it is not possible to pass more than a certain amount of information along a single nerve fibre. A complex mental picture depends upon a large number of fibres. The television engineer is able to produce a complicated picture with a single aerial. A single wire is capable of carrying a dozen telephone conversations. But the brain is capable of infinitely greater variety than television or telephone.

One may conclude that, in the main, variety of experienced sensation is dependent less upon the sense organ concerned, the mode or frequency of its transmission, or the number of fibres employed. The variety must depend upon some other factor, which must be the complex and fluctuating pattern, the spatial arrangement, in which excitations are received at particular areas of the brain.

The arrival of a stimulus at the brain is only one link in a chain of events. Subsequent links are probably also further excitation patterns, each initiated by the one before, and ending perhaps in a pattern set up in the motor area. At the same time perhaps, other patterns are set up elsewhere, and upon these patterns may depend all the complex activities which constitute thought and mind. The brain is certainly of a size to accommodate many different local patterns and the exceedingly complex interaction between them at any one time. Such interaction takes place in part, at least, through brief waves of surface activity which can be recorded.

These interactions may themselves come to be repeated or associated in patterns dependent upon the initiating stimulus, or may be set in motion by other contiguous constellations of interacting patterns established by structure or experience. Adrian believes that events in the brain are dependent in part upon other associations in a more or less static system. Thus memory, judgment, decision, emotion, all the facets of perception, come to be involved in mental activity through the medium of a multiplicity of established or novel constellations of patterns of excitation; these patterns being lighted by the activity of neighboring patterns, and culminating perhaps in a motor activity—or when motor activity is by-passed or suppressed, in thought.

Messages from the sense organs are received at the cerebral cortex and can be followed to that point. At the sensory cortex a map of the environment is formed. Some of these sensations are extinguished by the very chain or pattern they set up, by a feedback mechanism which maintains the normal individual in harmony with his surroundings. It is probable that consciousness may be reached by paths other than those which lead through the mapped sensory cortex. In addition, it now appears probable that a general substratum of consciousness, as distinct from specific modalities, is dependent upon the integrity of the brain-stem reticular formation rather than upon external stimuli acting through the sense organs.

These external stimuli act upon the sensory organs, and there is then a sensory inflow to both cerebral hemispheres. Thus each sensory modality is represented in the brain by patterns of activity differing in complexity, in spatial arrangement, and in area involved, according to the relative importance and need of the modalities. These cortical patterns are interconnected with each other, with already established patterns, with the motor cortex, and to varying degrees with still other patterns associated with conscious awareness. It is also postulated that any incoming sensation is represented not only by a spatial pattern of excitation, but also by a shifting sequence of activity over that pattern. That is: there is a temporal, in addition to a spatial organization. By these means a word, a note of music, a touch, are appreciated as wholes, associated with other simultaneous or remembered patterns, extinguished or passed to consciousness, and acted upon. By these means, a stimulus is perceived. The brain interprets the picture of external events which is formed upon the cortex, and this interpretation is carried out through the medium of these numerous other patterns which have been referred to. The picture may then be passed to consciousness and may then help to determine behavior.

There are, of course, many perceptive activities which while being examples of the integrative action of the nervous system, are yet not readily explainable in terms of external stimuli. The so-called "motor" theories of perception and thought explain this, for instance, by identifying thought with inaudible movement of the vocal cords. Lashley has pointed out that this argument is not tenable. In the famous example "the millwright on my right thinks it right that some conventional rite should symbolize the right of every man to write as he pleases"[2] (p. 116), the arrangement is not due to direct association links of the word "right" with

others. The order may be determined by intention to act, or by the idea which is to be expressed. This hypothesis also fails to solve the problem. There is disagreement among psychologists regarding the nature of an idea. The structuralists postulate that it consists of mental images. Others expound the doctrine of imageless thought, holding it to be an organization which comes before expression, but they do not explain how imageless thought passes into speech. This passage may perhaps depend upon motor pathways already laid down. It is probably nearer the truth to suppose that some activities such as thought require a general facilitation of consciousness such as that subserved by the brain-stem reticular activating system, in addition to specific external or internal stimulation.

In all his arguments, Adrian seems to assume that sensation is received into a more or less static system. Others such as Lashley,[2] postulate that the existing system is actively organized and excited, and that the cortex is a network of active reverberating circuits.

This paper suggests that the latter hypothesis is likely to be rewarding in the light of further experience and study, for it would seem that many of the complex activities connoted by the term perception may be susceptible of explanation in such terms. Any stimulus reaching such a system, whether arising from external or internal sources, or from within itself, will produce changes throughout the system rather than an isolated response.

This concept of interconnected reverberating circuits has been used by others to explain some of the phenomena of memory. For instance, some of the activities of mind associated with speech, activities which involve temporal integration rather than dependency on external stimulation may be explained in such a manner. Shakespeare's line in Hamlet, "Purpose is but the slave of memory" may well be a statement of neuro-electro-physiological fact.

It may be that many of the other phenomena of perception associated with activities occurring after reception of a stimulus at the cortex may be explained in similar terms. Such phenomena include those of recognition, decision, the formation of habit, choice of action, imageless thought and speech, perceptual defence, the nature of ideas, and all the other complex attributes of mind. The author[4] recently reported a case of tumor involving the reticular activating system in the neighborhood of the third ventricle. This case remained a sentient being although unresponsive to external stimulation, immobile and mute. One can postulate that this patient, while retaining her existing system of reverberating and interconnected circuits, had been deprived of the switches which could set them in motion in relation to each other.

If this be so, many of the disorders of perception and of consciousness prominent in psychiatric disease may be susceptible of similar explanation. Such a hypothesis would seem to be worthy of study by psychologist, neurophysiologist, and psychiatrist alike.

We know that temporal and spatial patterns are thrown upon the sensory cortex by sensory stimulation. We can trace the route from the sense organs to the cortex along fixed pathways to their destination. We know and can measure electrical activity over the cortical surface. We do not know what occurs subsequently. We cannot define or measure other phenomena of perception and of mind, the phenomena which intervene between receipt of a stimulus and subsequent action or thought. The speculation is made here that these phenomena may depend upon a cosmos, consisting of a multitude of related reverberating circuits each capable of stimulating the next, this whole complex system being, as it were, superimposed upon another active generalized, nonspecific substratum of consciousness independent of external stimulation.

It is similarly speculated that disorders of perception may be due to a dislocation at any point within this cosmos. It is finally suggested that such a hypothesis is worthy of interdisciplinary study. Perception is probably not an abstracted process, but rather an integral developmentally and experimentally determined process in the functioning human being.

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The Use of Glucagon in Terminating Insulin Coma

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Reports are appearing which question the usefulness of insulin coma in contrast to other therapeutic procedures now available in the armamentarium of the psychiatrist.[1,2,3,4] Whether or not insulin coma is eventually replaced by more effective treatment procedures, it was felt that the experiences gained at the Spring Grove State Hospital over the past three years in terminating insulin coma with the use of Glucagon would be of interest.

Previous to the introduction of Glucagon, the termination of insulin coma in the patient was frequently a trying experience for patient and physician. There would be patients whose veins would become sclerosed by the repeated intravenous injections of hypertonic glucose during the treatment procedure. These obliterated blood vessels plus the physical development of some patients such as obesity, excessive muscular development, etc., would frequently present the treatment personnel with the time consuming business of trying to locate a suitable vein with the accompanying anxiety until entrance could be effected into the blood vessel. Frequently this was not accomplished without traumatizing the surrounding tissues of the patient.

In 1956 Schulman and Greben[5] reported on their experiences in exploring the effect of Glucagon in patients who had received massive doses of insulin. They had considered the possibility that Glucagon might serve as a useful agent in terminating insulin coma. Their premise was based on the knowledge that Glucagon, a naturally occurring hormone, namely, the "hyperglycemic-glycogenolytic" factor elaborated by the alpha cells of the pancreatic islands of Langerhans, had been demonstrated to produce a rise in blood sugar by converting hepatic glycogen to glucose through its effect on the phosphatase system. A recent review on Glucagon which is well summarized is that of Van Itallie.[6] Another factor which also gave added impetus to the work of Schulman and Greben[5] was the availability of increasingly pure preparations of Glucagon with the ultimate attainment of a crystalline preparation[7,8] which they were able to use in their study.

In their initial study Schulman and Greben administered Glucagon on 141 occasions to 11 patients in insulin coma. The Glucagon was administered intramuscularly, intravenously, and subcutaneously. The intravenous route was found to be superior to the intramuscular route of administration with the subcutaneous route much poorer than either of the others. They also obtained the impression that responsiveness to Glucagon increased during the course of insulin coma therapy.

A larger clinical study subsequently followed.[9] In this latter study Glucagon was used in 1930 trials on 50 patients and was largely due to the work at the Spring Grove State Hospital. As a result of this study crystalline Glucagon was now being administered as a standard procedure in doses of 5 ml. of buffered solution containing 5 mg. of crystalline Glucagon to patients who had received from 10 to 2800 units of regular insulin with an average dose of 238 units. The only area where it seemed to present diffi-

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culty was in those patients who during the course of their coma had a spontaneous convulsion. Here for some reason it would fail one time in four.

This report deals with a further series of 545 trials using crystalline Glucagon administered intramuscularly to 13 additional patients and concludes a study which has been going on at this hospital for the past three years. In all, there are now 63 patients who have received a total of 2,475 terminations. The technique worked out for this procedure is to give 5 mg. of crystalline Glucagon intramuscularly at the time of termination. This is usually in patients in their third or fourth stage of coma, utilizing Himwich's criteria.[10] A few minutes following the administration of Glucagon there occurs a gradual lightening of the depth of coma with most of the termination time consumed in the transition from light second stage to complete awakening. The average awakening time for this last group of 13 patients treated was 15.3 minutes. The average time of recovery from stage 2 was 14.51 minutes; stage 3—14.77 minutes; and stage 4—16.71 minutes.

The coma was considered successfully terminated when the patient was able to respond verbally to questions and was able to take fluids orally. If these conditions were not met, or if the coma returned during the time the patient was still on the insulin ward (a period of at least one hour) Glucagon was regarded as a failure and intravenous glucose was administered. In the 545 patients treated, there were 7 failures with 4 out of the 7 occurring where there had been spontaneous convulsions. Immediately on awakening the patient was given orally fluid containing carbohydrates. The effectiveness of a given dose of Glucagon in terminating insulin coma did not depend on the dose of insulin. The duration of the termination time is more directly related to the stage of coma. Hyaluronidase (150 turbidity units) was added to Glucagon in approximately half of the cases. It was found that it had no effect on the termination time of the coma.

Conclusion

The absence of untoward reactions indicated a high degree of safety. Glucagon produces a slow, gradual, and smooth termination of coma in contrast to the sudden awakening with intravenous glucose. No prolonged coma occurred. Tube feeding was not necessary. The outstanding advantage of Glucagon over intravenous glucose was the increased ease of injection, 5 cc. intramuscularly vs. 50 cc. of 33% glucose given intravenously. With Glucagon there was no local reaction when given intravenously or better still, intramuscularly.

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Effect of Meprobamate on Patients in Intensive Psychotherapy

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Psychiatric literature during the past three years is replete with reports attesting to the clinical efficacy of various tranquilizing drugs. It has become almost customary for investigators in reporting their clinical experiences with these new pharmacologic agents to mention the finding of "increased amenability to psychotherapy," in varying degrees. With few exceptions,[1,2] however, very little detailed information is given concerning the precise effects of these drugs on the psychotherapeutic process.

Since the phenomenon of "resistance" in psychotherapy is, in the final analysis, inextricably associated with varying degrees of inordinate fearfulness on the patient's part, this study was undertaken in an attempt to clinically evaluate any changes which might occur in the treatment or life performance of individuals in intensive psychotherapy when this fearfulness was attenuated by a tranquilizing drug. In an attempt to more specifically demarcate the effect of such a drug, it was decided that it be administered immediately before a few sessions occurring midway through treatment. Data obtained from these sessions were then compared with treatment behavior both before and after drug administration and a retrospective view obtained not only of the drug's immediate effects, but of its effect on treatment as a whole. This design obviated the need for placebos as "controls" since it was anticipated that any response based on suggestion would inevitably be clarified with the help of introspective material obtained during later sessions. The use of different therapists[4] in this study further helped to minimize the possible effects of suggestion. Obviously, this technic could not give any information concerning possible alterations in the psychotherapeutic process when a drug is given early and over a longer period of time during treatment. However, it was hoped that even this limited data might more clearly point out future directions in the evaluation of drugs as adjuncts to psychotherapy. Meprobamate (Equanil, Wyeth) was chosen for this study because of its established ability to diminish manifestations of anxiety, the relatively rapid onset of action after administration, and the relatively few significant side effects.

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Method

The five patients selected for this study were from a group undergoing intensive psychotherapy by residents and staff at Hutchinson Memorial Clinic. Treatment technique would most generally be described as "analytically-oriented psychotherapy." Diagnoses were: 1) psychophysiologic gastro-intestinal disorder; 2) obsessive compulsive neurosis; 3) chronic undifferentiated schizophrenia; 4) anxiety reaction; and, 5) hysterical character disorder. It should be mentioned that cases 2 and 4 were later placed in the "pseudoneurotic schizophrenic" group using the criteria for this diagnosis as described by Hoch and Polatin.[3] Nonetheless, with the exception of case 3, all were individuals representative of the small percentage of psychotherapeutic candidates with whom transference phenomena and uncovering technic may be directly utilized in the treatment process. It was felt that only such a group could reliably give at least some of the information being sought since direct introspective access was available to their reactions.

Meprobamate was administered only when the patient had been in treatment for a sufficient period of time so that the significant psychodynamic interplay and established mode of psychologic adaptation were reasonably clear both to the therapist and, in the three cases being supervised, to the supervising staff member. The patient was told that a member of the staff was engaging in a study to determine the effects of this med-

ication on their feelings during the psychotherapeutic sessions. Actually, since these patients were all from a relatively psychiatrically sophisticated group, they were already familiar with this drug and needed no reassurance regarding the possibility of adverse effects. They were instructed to take one 400 mgm. tablet during a weekend and to note the period of time before effects were detected. If no effects were noted after one dose of 400 mgm., they were instructed to take a second dose, this time consisting of two tablets (800 mgm.), following which they were to time their own administration of the drug so that activity would be at a maximum level during the time they were in treatment. Generally, this was continued for about two weeks, and comprised six, two, seven, three, and two sessions, respectively.

Case Summaries:

Case 1. A 20 year old, white female college senior was admitted to the clinic for treatment of obesity and mild depression. Intake interviews and psychological testing revealed excellent motivation for therapy and a fundamentally healthy and intact ego. Although the symptom of obesity was markedly overdetermined, one of its most striking purposes for this patient was defense against interpersonal sexuality. This became more clear during the early sessions as her associations and dreams vividly portrayed intense guilty fears in relation to almost every aspect of the feminine role. Interestingly, as more details of her early development became available, it was strongly suggestive that she had responded to her father's unconscious need to keep her "fat and undesirable."

Her early treatment behavior was characterized by continued strong motivation, good introspective ability and the development of a strong "positive transference" wherein she essentially played the role of the "good little girl" during the sessions. On a few occasions, however, her deeper feelings about treatment were betrayed by mildly verbalized statements doubting the therapist's interest in her, thinly disguised wishes that the therapist do more for her than just occasionally say something, and not infrequent treatment behavior designed to test the possibility of rejection, thereby confirming in her own mind the picture of men being responsive to only the most superficial of her needs. At no time during these sessions, however, was she able to openly express anything more than "liking" the therapist.

Meprobamate, 800 mgm., was administered before sessions 45 through 51. Although the patient did not comment specifically about any subjective effects, the therapist definitely observed increased "frankness" and manifestations of more "real feeling" than had previously been noted. Session 50, however, was in striking contrast to her previous treatment behavior. During this session she emotionally expressed anger, resentment and jealousy after having seen the therapist in the company of another woman. This immediately led to frank oedipal material and the realization on her part that this was the first time in her life she had been able to directly express anger in relation to her feelings of rejection. These associations were dealt with during subsequent sessions and comprised the beginning of an important phase of treatment.

On two occasions after the drug was discontinued, the patient spontaneously remarked that she had "talked more freely" during the sessions under consideration. This corroborated the therapist's impression, who noted that the facilitation of productivity then continued even without the drug, later material in no way suggesting that she had interpreted the cessation of the drug as a rejection. During over 150 subsequent sessions, the patient has made excellent progress, particularly in the realm of interpersonal relationships and sexuality and termination of therapy is planned for the near futurie.

Case 2. A 40 year old, unmarried white male had been in psychotherapy intermittently over a period of several years and had been seen once a week during the year prior to this study. Originally, the problems presented were predominantly those of a fear-driven obsessive with rigidly ritualized behavior, marked ambivalent submission to all authority and frequent manifestations of uncontrolled anxiety expressed to a great extent by GI symptoms. His treatment behavior was marked by a surprising freedom of expression and unusual ability to put insights gained during treatment into practice. At the time of this study he had made important strides forward, particularly in regard to a dominating father-older brother constellation and his work behavior. However, he was still strikingly inhibited in the sexual area and had been repeatedly impotent when attempting intercourse.

Treatment behavior following meprobamate, 400 mgm., did not show any perceptible change although the patient described feeling "less tense." Actually, he had never before withheld conscious feelings or thoughts and had always been remarkably candid during the sessions. When he arrived for his second session of this study, he was exuberant and glowing with success. He reported how he had evolved the idea of taking meprobamate, 400 mgm., prior to his "date" to relieve the "tenseness" which had previously incapacitated him sexually. He experienced a marked reduction of anxiety and was able to function sexually for the first time in his life. As so often happens, this adaptive success was followed by new and important insights and, over the next several weeks, by dramatic improvements in many other areas. In the eight months (25 sessions) since that time the patient has maintained and consolidated these gains to such an extent that termination of treatment is rapidly approaching.

Case 3. A 30 year old, married white female initially entered therapy because of an acute hypochondriacal and phobic reaction following the death of an invalid mother. The diagnosis in this case was chronic undifferentiated schizophrenia and treatment was planned accordingly, less emphasis being placed on "uncovering" technic than on establishing less disruptive defensive patterns. With this treatment plan, the severe agoraphobia and intense cardiac concern cleared rapidly, although it was evident that these improvements were to a large extent dependent on the patient's ability to "borrow ego" from the therapist. Her treatment behavior then became principally motivated by the desire to please the doctor and there were many sessions during which she openly admitted she was not "telling all" for fear the therapist might not like her.

This patient had previously taken many drugs, principally barbiturates, without much effect other than mild sedation. Meprobamate, 400 mgm., was given before session 82 and continued for three weeks (seven sessions). In the very first session following the drug, the patient both subjectively and objectively talked more freely and was able for the first time to frankly discuss her tremendous guilt regarding sexuality. This "confessional" was followed by a dramatic sense of relief on her part and was also associated with definite diminution of inhibitions in her behavior outside of treatment. At the time of this writing, some fifty sessions later, the patient has, despite occasional brief returns to the guarded treatment behavior which was consistently observed prior to the administration of meprobamate, generally continued to be more free in her verbalizations during therapy. In the opinion of her therapist, "Equanil was the breakthrough."

Case 4. A 30 year old, unmarried female had been seen twice a week for a total of 85 sessions prior to the study. Her predominant defensive patterns were obsessive in nature, manifested characteristically by carefully controlled behavior both in and out of treatment. Underlying this was a pan-neurotic syndrome and the usual accompanying pan-anxiety. Generally, her treatment behavior, although frequently marked by a good deal of tension, was controlled, quiet and not especially characterized by unusual introspective propensities.

This patient took meprobamate, 400 mgm., prior to three sessions. She reported feeling definitely more "relaxed" for the first time during treatment, and began to discuss her guilty fears in regard to her early relationship with her father. After her three sessions with meprobamate she voiced the opinion that she "got into things better" during these sessions. During 40 subsequent sessions, the patient has continued to sporadically touch on this highly-charged area, but has not as yet again presented as much detailed introspective data as she did during the three sessions under study. Again, no adverse transference reactions were noted.

Case 5. A 35 year old, married male artist, predominantly hysterical in character, had exhibited rather dramatically uninhibited treatment behavior during the 80 sessions preceeding the study. At this time in his treatment he looked upon the therapist as a "good father" and was quite anxious to please, so much so that when the study was mentioned it brought forth associations dealing with a professed desire on his part to take LSD or mescaline in an attempt to better "get into" his feelings. After two sessions with meprobamate, 800 mgm., he expressed disappointment at not having experienced anything more dramatic than slightly increased "relaxation." No demonstrable difference in treatment behavior was observed during these two sessions or in the course of 35 sessions following the drug administration.

Discussion

Obviously, no dramatic conclusions can be drawn from the cases who showed changes subsequent to administration of meprobamate. There seems to be no question, however, that case 1 experienced a greater ease in verbalizing feelings that she had previously been too fearful to openly express during the treatment sessions. Most interestingly, and as might well have been predicted, these feelings were in context of the doctor-patient relationship ("transference"), the area most highly charged with feelings as therapy progresses. (Observations concerning the sometimes striking alterations of transference phenomenon when chlorpromazine was administered have already been reported.[4]) Her later reports of having talked more "freely" during the sessions following meprobamate are especially interesting in view of the spontaneity of these statements and the lack of any associative material presented at that time or later to implicate a covert motive on her part to have the therapist "feed" her again.

Actually, the therapist had anticipated that some problems might arise in the transference as a result of his giving her oral medication, particularly since the entire area of orality and feeding were so crucial in her life development and present symptomatology. Nothing of the sort occurred. One might speculate that the therapist's simple and forthright request for cooperation in this study enabled the patient to view the reality of the situation in a more mature fashion; another example, perhaps, of occasions in psychotherapy when people are ca-

pable of more adult participation than we are sometimes aware.

Case 2 presents for consideration the possibility of an entirely different potential use of meprobamate as an adjunctive aid to psychotherapy, specifically, employment of its anxiety alleviating effects to help the patient overcome neurotic inhibitions in his behavior outside of treatment. The increase in pride and self-esteem attendant to this success in behavioral alteration quite often does, as in this patient, produce a pyramiding of success upon success concomitant with, or followed by, a real change in attitude. The importance of changes in behavior preceding attitudinal changes is currently receiving increasing recognition in both psychiatric and sociologic literature.[5] The third and fourth cases similarly demonstrate the facilitation of productivity during sessions when the inhibiting anxiety is reduced. This is corroborated by case 5 where no inhibition in treatment performance had previously been noted and no demonstrable difference was produced by meprobamate.

Although not included in this study, the author is aware of a patient in analysis who, after initially having taken meprobamate for relief of tension headaches inadvertently discovered that production of material during analytic sessions was greatly facilitated by this drug. This patient then selectively self-administered meprobamate before sessions when especially disturbing material was anticipated, was then able to continue working-through these areas without the use of meprobamate, and has since successfully terminated the analysis.

It is in no way surprising that reduction of a patient's anxiety level produces detectable changes in his treatment behavior. Clinicians have repeatedly observed how rising anxiety can bring the therapeutic process to a complete halt, the patient's ability to think undergoing degrees of paralysis (we are excluding schizophrenic decompensation). At these times the immediate task is to relieve this anxiety. Usual technic involves temporary circumvention of the emotionally-laden material, adoption of a more supportive and reassuring role by the therapist and in the past, when necessary, the administration of a sedative. Although no such occasions arose during this study, it might parenthetically be suggested at this point that meprobamate receive serious consideration as the drug of choice under such circumstances.

In this study the drug was administered to patients who generally were not acutely anxious. The widely-heard concern of interfering with motivation for treatment by decreasing the patient's anxiety was not borne out by this study. On the contrary, when introspection was facilitated by meprobamate it generally was self-perpetuating even after the drug was discontinued. Our impression is that the problem of diminishing therapeutic motivation would be of more importance when a patient was continually taking the drug both in and out of treatment as a means of totally avoiding any potentially stressful situation. In this latter instance, drug dependence might well compound the already maladaptive behavior. The therapist using a drug as an adjunctive aid to psychotherapy should, as with his interpretations to the patient, be guided by judicious and appropriate timing.

An interesting sidelight is the fact that none of the therapists involved in this study made use of the drug on their own initiative after the sessions described. When they were pointedly asked why they had not used meprobamate again, they replied, "I'm not sure. I've been taught you just don't use drugs in this kind of treatment" (Case 1); "I don't know why I didn't give it agan. I thought of it as a test, but I think I'll try it again now" (Case 3); "I'm not sure. I guess I wasn't convinced of the effects of the drug" (Case 4). Clearly, the therapists' inhibitions in using drugs during psychotherapy is a topic for a study of its own.

Summary

Results of this study suggest that appropriately used, meprobamate may, by reducing both overt and covert anxiety levels, facilitate production of important material during psychotherapeutic sessions and also help the patient to overcome inhibitions in his life performance.

It is hoped that the data presented here

will arouse the interest of those psychiatrists who are concerned with modifications of existing psychotherapeutic technic and whose goal, like that of the patient's, is a shorter and more efficient psychotherapy.

Author's Note: Meprobamate used in this study was supplied by Wyeth Laboratories, under their tradename, Equanil.

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A Clinical Study of Marsilid in Psychotic Depressed Patients

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The present paper deals with the results obtained from a clinical study on 11 female psychotic patients with evidences of severe depression, treated with iproniazid (Marsilid). Loomer, Saunders and Kline[1] administered the drug for five months to 17 chronic female, institutionalized patients, most of whom showed signs of withdrawal and deterioration. "Appreciable" effects were noted in four and "some response" was shown in seven. Three showed transient or no effects, and three had unfavorable side effects. Ayd[2] treated fifty depressed and debilitated patients with Marsilid for three months and found that five were improved (almost complete remission); 19 were partially improved; 15 were unimproved. The medication was discontinued in 11 patients because of side effects.

The pertinent data on the patients are shown in Table 1. The patients, all women, ranged in age from 29 to 60 years, with an average of 36.6 years. They had been hospitalized from eight months to seven years, the average being 1.3 years. Seven patients were diagnosed as having schizophrenia, four of the paranoid and three of the schizo-affective subtype. Three others were considered to be "pure" depressions, and one an undiagnosed psychosis. The initial dosage was 100 mg. Marsilid daily which was increased in most cases to 150 mg., and in two

From the Dementia Praecox Project, Worcester State Hospital, Worcester, Massachusetts, aided by a Ford Foundation Grant to the Worcester Foundation for Experimental Biology, Shrewsbury, Massachusetts.

TABLE 1

Psychiatric Data and Results of Treatment With Marsilid

No.	Age	Dur. Hosp. Yrs.	Diagnosis	Dosage mg.	Dur. Treat. Mos.	Clinical Result
1	34	1	Schizo-Affect	100-150	2	Home on visit
2	29	2	Schiz.-Paranoid	100-50	3	Ward Parole
3	33	1	Schiz.-Paranoid	100-150	2	Ward Parole
4	55	2	Psychot. Depress.	100-150	3	Ward Parole
5	35	2	Schiz.-Paranoid	100	3	Less Depressed
6	36	.7	Psychot. Depress.	100-150	3	Less Depressed
7	37	1	Schizo-Affect	100	3	Less Depressed
8	42	2	Schizo-Affect	100	3	Less Depressed
9	42	2	Schiz.-Paranoid	100-150	3	Less Depressed
10	39	7	Undiag. Psychosis	100-200	3	No change
11	60	1	Invol. Melancholia	100-200	3	No change
Mean	36.6	1.3				

TABLE 2

Psychiatric Rating Scale

FUNCTION	6	5	4	3	2	1	Line Base	1	2	3	4	5	6
APPEARANCE	Bizarre		Decorative		Over-Meticulous			Slovenly		Untidy		Incontinent	Smearing
MOTOR ACTIVITY	Excited		Agitated		Restless			Underactive		Retarded		Stuporous	
MIMETIC EXPRESSION	Incongruous		Dramatizing		Exaggerated			Stiff		Waxy-Flexibility		Mask-Like	
RESPONSIVITY	Anaklitic		Suggestible		Dependent			Stubborn		Resistive		Negativistic	
HOSTILITY REACTIONS	Destructive		Combative		Belligerent			Self-Deprecating		Self-Mutilating		Suicidal	
SOCIALIZATION	Disruptive		Meddlesome		Out-Reaching			Shut-In		Isolated		Inaccessible	
ATTENTION	Uncontrolled		Markedly Distractible		Moderately Distractible			Preoccupied		Disparative		Completely Withdrawn	
SPEECH	Incessantly Productive		Push-of-Speech		Over-Talkative			Under-Talkative		Retarded		Blocking	Mute
MOOD	Exhilarated		Euphoric		Enthusiastic			Sombre		Despondent		Deeply Depressed	
AFFECT	Inappropriate		Explosive		Labile			Inadequate		Bland		Flat (Rigid)	
FEELING	Panic	Anxious		Tense	Hypersensitive			Phlegmatic		Dull		Apathetic	
PERCEPTION	Hallucinations		Illusions Pseudo-Hallucinations		Exaggerated Intensity			Self-Observation		Hypochondriasis		Conversions	Somatic Hallucinations
THOUGHT PROCESSES	Fragmented		Allogical Paralogical		Illogical			Obsessive Hair-Splitting		Obsessive Doubt		Rationalizing	
SUBJECTIVE REORGANIZATION	Cosmic Del. (Omnipotence)		Del. of Grand.	Ideas of Pers.	Ideas of Inf.	Ideas of Refer. (Autism)		Ideas of Inferiority		Self-Accusatory		Somatic Delusions	Nihilistic
INSIGHT	Negation of Problem		Prob. Exogen.	Recog. of Prob. without Concern		Shifting of Blame		Self Hyper-Critical		Add. of Non-Exist. Problems		Despairing Self-Blame	Attitude of Comp. Helplessness

patients to 200 mg. daily. In one patient, owing to the appearance of an ataxic gait, the dosage was reduced from 100 to 50 mg. daily. The medication was maintained for three months in nine patients and two months in the other two.

The clinical results are shown in Table 1. All these patients had been on closed wards and had had ECT treatment previously with no improvement. Coincident with the present medication, one patient went home on visit, three improved enough to be transferred to open wards, five showed some lessening of the depressive features. Two showed no change.

The patients were interviewed at bi-weekly intervals and were rated on a modified form of the Malamud-Sands scale,[3] in which 15 items were scored to determine the effects on various phases of the clinical picture. This scale is shown in Table 2. The deviation from the normal in each item is rated on a six-point scale on either side of the base line and a total score obtained by the addition of the numbers for each item. The first seven items can be observed directly and the next eight can be determined from the responses during the interview. In a general way, the gradations on the left represent those attitudes which are directed away from the subject, and those on the right indicate internally directed forms of behavior. The higher the score, the more abnormal is the clinical status of the subject. A decrease in the score represents improvement.

The average trend for the sum of the scores on the eleven patients before and during the period of medication is shown in Figure 1. There was an initial rapid decrease in the group score during the first month and a lesser decrease subsequently. Most of the decrease in the score was noted within the first eight weeks of medication.

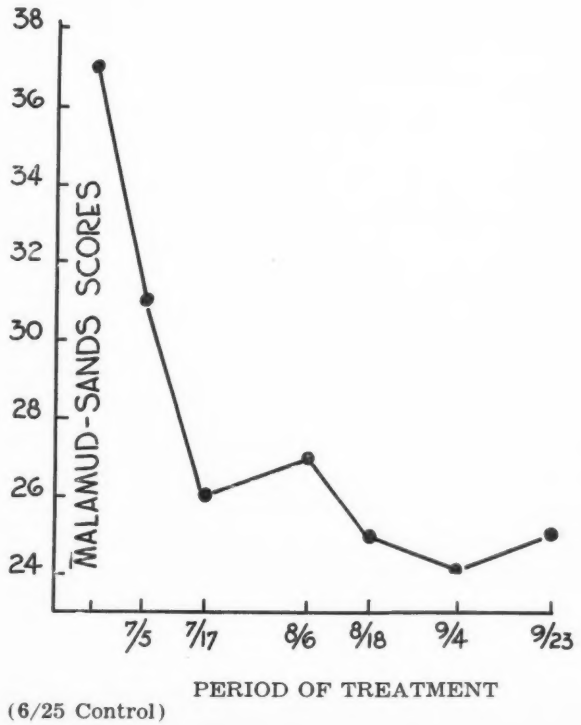

Figure 1. Mean group scores during period of medication with iproniazid.

TABLE 3

Results of Marsilid Treatment on Individual Rating Scores

Initial Score	Final Score	Difference	% Final Initial
50	24	26	48
49	25	24	51
48	26	22	54
41	26	15	63
39	28	11	72
38	28	10	74
32	25	7	78
29	29	0	100
24	21	3	88
22	27	—5	123

Individual changes are shown in more detail in Table 3, which contains the data on the initial score, the final score after three months of medication, the difference between these two and the percentage change from the first to the last score. The values are placed in the rank order of the initial scores. In the third column of figures (difference in scores) it may be seen that nine of the patients showed a decrease in score (toward improvement), one showed no change and the eleventh had a slight increase. The differences are paralleled by the percentage changes. It is of interest that the patients who had the highest initial scores (most abnormal behavior) showed the greatest changes. The patients who had the lower scores (least abnormal behavior) showed the mildest changes.

In order to determine the effect of the drug on the individual components of the rating scale, a comparison is shown (Fig-

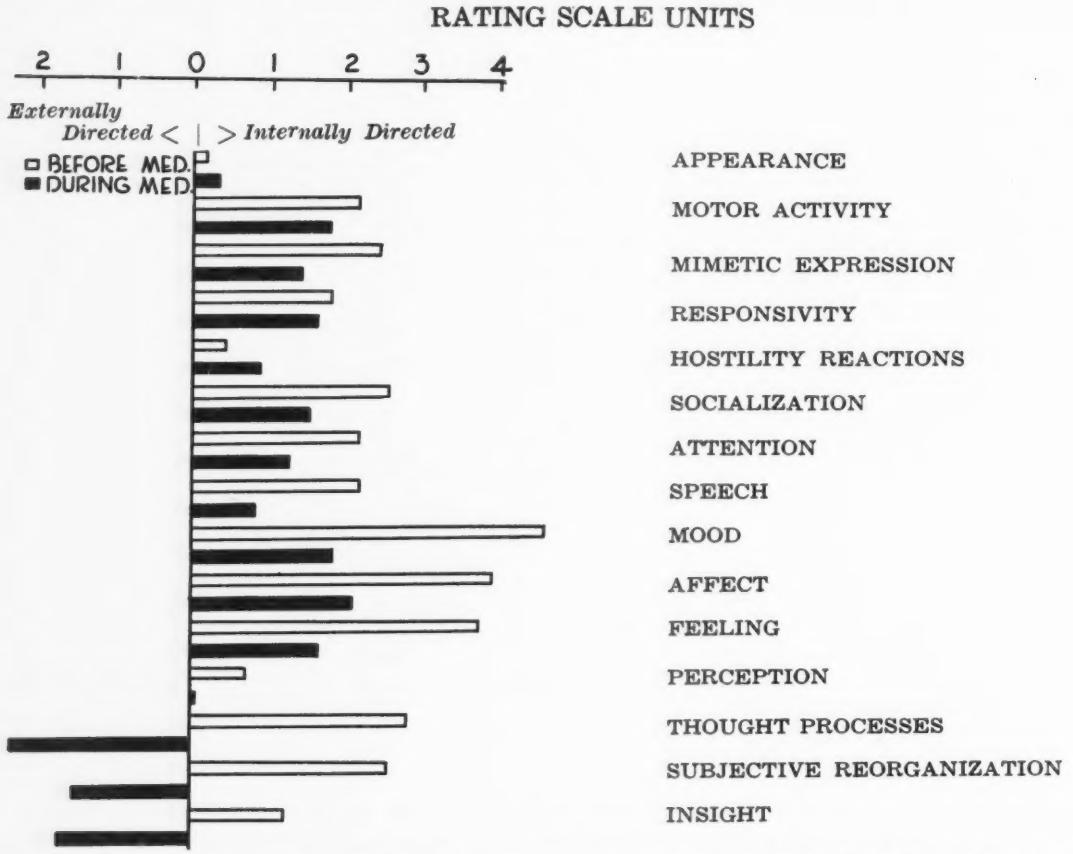

Figure 2. Comparison of mean group values for items on rating scale before and after three months treatment with iproniazid.

ure 2) of the average values for the group on the fifteen items before medication was instituted and after three months of medication. Each item has a white column for the control value and a black column for the value during medication. It is seen that motor activity, mimetic expression, responsivity, socialization, attention, speech, mood, feeling and perception show a decrease (toward normal) of the values during medication. Hostility, on the other hand, is slightly increased. In these items (except for hostility) the drug acts like a tranquilizer, as Ayd[2] has pointed out. In the items of thought processes, subjective reorganization and insight, the values have shifted from the right, internally directed side of the scale to the other side, i.e., from obsessive ideas, somatic delusions and despairing self-blame, to illogical thinking, ideas of inference and shifting of blame. From this point of view, the drug has altered the type of thinking but not necessarily in a entirely beneficial manner, toward a "schizoid" type of ideational content. Whether this is due to the fact that the majority of the patients are schizophrenic can be determined only by using the drug in a sufficiently large number of non-schizophrenic depressions.

Discussion

It should be stressed that this study was carried on to determine if any changes resulted from the administration of the drug, and it is recognized that some of the effects observed may be due primarily to the increased attention paid to the patients. However, we must consider that the shift in the type of thinking, from the hypochondriacal to the schizoid type, has not been noted before, either with placebos or with tranquilizing drugs.[4] It is probable, therefore, that this amelioration of depressive features is a real effect in these patients. While the therapeutic effects in this study are not too striking, more beneficial results may be noted in

depressions without an underlying or organic background.

Summary

The administration of iproniazid to eleven female psychotic patients with depressive features resulted in a lessening of the depression in nine patients. Only one patient went home, while three were transferred to open wards. Analysis of the rating scales showed that the depressive features disappeared, to reveal underlying schizoid thought processes.

Authors' Note: We wish to express our thanks to Hoffman-LaRoche, Inc., for supplies of Marsilid.

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Apparatus and Method for the Study of Conditional Reflexes in Man (An Abstract)

LEO ALEXANDER, M.D.

In this paper we report preliminary results in normal control subjects, in mental disorders and as a result of drug action with the use of polygraphic apparatus recording stimuli and responses in an objective study of conditional reflexes in man.

The five channels of the Grass polygraph modified to include the conditioning signals allowed the following recordings:

A. The electroencephalogram (EEG) or the eye movements.
B. The electrocardiogram (EKG).
C. The acoustic and electric signals (S).
D. The respiration (R).
E. The psychogalvanic reflex (PGR).

The unconditional stimulus used is a unidirectional current flowing from the palm of the hand to the tip of one finger only, thus eliminating variations in current depending upon variations in width of current path. Variations in resistance are eliminated by a preliminary step in current setting at the minimal threshold of flow of current, thus balancing skin resistance.

Normal control subjects and patients suffering from a variety of nervous and mental disorders were studied before and after the administration of psychotropic drugs. Of the latter, a relaxant drug (meprobamate), an anti-phobic drug (benactyzine), and a tranquilizing drug of the phenothiazine series (trimeprazine) have been studied.

The phenomena observed included differentiation, excitatory generalization and inhibition. Differentiation came about quickly in normal control subjects, sometimes as early as the third pair of presentations. Differentiation was delayed, impaired or entirely unobtainable in the various abnormal mental states studied due to excitatory or inhibitory phenomena, including excitatory or inhibitory generalization.

In normal and anxious subjects, differentiation was usually achieved earlier for the PGR responses than for the electrocerebral alerting responses, indicating a schizokinesis between electrocerebral and PGR responses similar to Gantt's finding of schizokinesis between motor and autonomic responses.

The phenomenon of excitatory generalization most consistently found in anxiety states, particularly those with phobic symptomatology, was the development of a two-step pattern in the PGR response to the in-

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From Neurobiologic Unit, Division of Psychiatric Research, Boston State Hospital and Tufts University Medical School.

hibitory tone generalizing from the two reflexes evoked by the excitatory tone and its reinforcing stimulus. Another item of generalization which, however, was less consistent with clinical diagnosis since it also occurred during the early phase of conditioning in normal control subjects, was an electrocerebral alerting response at the fifth second of the inhibitory tone, a time reflex derived from the timing of the reinforcing stimulus applied during the fifth second of the excitatory tone.

Phenomena of inhibition observed were reduction, delay or abolition of the conditional PGR, delay or abolition of the conditional electrocerebral alerting response, as well as a paradoxical reversal of the conditional electrocerebral alerting response, in that hypersynchrony occurred instead of desynchronization in the EEG. All these phenomena were observed in depressed patients, fully awake and not under the influence of drugs. The most consistent finding in depression was marked impairment or absence of the conditional PGR. In all of the depressions thus far studied (N=9), conditional PGR responses were significantly impaired and, in four of the five most severe cases, totally inhibited and unobtainable with the stimuli employed in this study. Paradoxical hypersynchrony of the electrocerebral alerting response to excitatory stimuli was prominent in severe depressions, but was found also in two patients with pain states, one being a case of intractable pain and the other a case with severe headache. It was also found in drug-induced inhibitory states with or without drowsiness in normal control subject but not in any of the anxious subjects within the dosage range employed in the present study.

The effect of drugs upon conditional reflexes depended to a large extent upon the pre-existing mental state of the subject. In abnormal mental states, meprobamate tended to promote differentiation in that it reduced or abolished excitatory phenomena and excitatory generalization in anxiety states, and reduced or abolished inhibitory phenomena, including the paradoxical hypersynchrony of the electrocerebral alerting response and the inhibitory generalization of the PGR in depressions. The fact that the same relaxant drug, at the same dosage, tended to relieve both the excitatory phenomena of anxiety and the inhibitory phenomena of depression lends support to the interpretation that the inhibitory phenomena of depression are the result of supramaximal excitation (Pavlov's paradoxical phase of excitatory stimulation).

In the abnormal mental states studied, benactyzine tended to promote excitatory generalization while trimeprazine tended to promote inhibitory generalization.

In the three normal control subjects thus far studied while under the influence of drugs, the three drugs used (either singly or in pairs) induced inhibitory states manifested by depersonalization or dreamy unreality without drowsiness or sleepiness or by states of drowsiness in which reduction and dedifferentiation of the PGR responses and paradoxical hypersynchrony of the electrocerebral alerting responses were observed. The latter were fairly well differentiated in that they occurred predominantly to the excitatory tone when such inhibitory states remained short of drowsiness, while differentiation was lost when drowsiness supervened.

The fact that psychotropic drugs may produce inhibitory phenomena in normal control subjects, while failing to produce such results in anxious subjects and actually relieving such manifestations in depressed subjects, suggests challenging opportunities for the use of the method reported for the differential diagnosis and evaluation of severity of mental disturbance, as well as for the determination of choice of treatment, choice of drug and drug dosage.

Book Reviews

REHABILITATION: W. Scott Allan, Supervisor of Medical Services of the Liberty Mutual Insurance Company, Pp. 247, Cloth. $5.75. John Wiley & Sons, 440 Fourth Avenue, New York, N. Y., 1958.

The book methodically covers the many-sided facets which enter into the rehabilitative restoration of the individual in respect of his physical as well as psychical capacities. It makes detailed references to the combination of disciplines, techniques and specialized facilities designed for physical as well as psychological adjustment, vocational guidance and reestablishment of the hampered person to maximum mental, physical and economic capabilities.

Increasing realization of the existence and entitlement to consideration of social, economic and emotional elements which frequently play a complicating role in disabilities, has shown the way to the concept of treating the whole man rather than merely his illness or disablement. This idea has become an expressed conviction and accepted as an essential area of psychiatric treatment. The author, practicably projects the thought that physicians in all branches of medicine will, as leaders in the promotion of restorative program, come to think of rehabilitation as an indispensable constituent of medical care in the provision of effective human reclamation.

The book discusses in an authoritative manner, such challenge concerned with rehabilitative activities as the weaving of rehabilitative patterns within the areas of medical practice, the integration of public and private programs for the disabled, the recruitment and training of rehabilitation personnel, improvement of social legislation, and of cooperation between community facilities, and maintenance of flexibility of scientific and research programs in order to isolate and combat such cripplers as poliomyelitis, multiple sclerosis and other physical and mental multidisabilities.

The book contains a well-balanced bibliography, among which are cited references to both legislative and medical aspects, together with a comprehensive subject index.

Lewis J. Siegal, M.D., LL.B.

THE PRESERVATION OF YOUTH (Essays on Health) by Moses Maimonides. (Translated from original Arabic, with an Introduction, by Hirsch L. Gordon, M.D., Ph.D., D.H.L. Philosophical Library. Pp. 92. $2.75.

This small volume is a translation of a work composed in Arabic by Maimonides in 1198. The original writing was done in Egypt for the Sultan Al Afdal, son of Saladin. The Sultan complained of poor digestion, chronic constipation and depressive moods, and Maimonides set out to help him.

It is surprising to note that the author, one of the more colorful figures of the 12th century and a capable and well known physician and philosopher, had ideas which were well in advance of his times. As an example, he spoke of the interaction of mind and body and, as the translator points out, "they were the cornerstone of his diagnoses and therapy in true psychosomatic tradition."

The small volume makes interesting reading, but Doctor Gordon feels that Maimonides' ideas and works are not only literary curiosa but that they are an "organic part of what was best and enduring in the medical traditions of the past."

Francis J. Braceland, M.D.

SELECTED WRITINGS OF JOHN HUGHLINGS JACKSON. Edited by James Taylor; Barrie Books, Inc., New York. 2 Volumes—1000 pp. $15 the Set.

These volumes which contain the most important of Hughlings Jackson's voluminous works are a truly remarkable compendium. Edited by the distinguished James Taylor, who also edited Jackson's "Neurological Fragments" published several decades ago, they set forth the reasonings and the practical genius of a man well ahead of his time. The assemblage and selection of works must have been difficult, for even as Jackson's mind was nimble, his contributions were generous and he spoke and published in various places.

The excellence of the clinical observations of this man, known as the "Father of Modern Neurology," are too well known for comment. What is not sufficiently known is the depth and range of his medical philosophy and his interest in psychology; in fact, were it not for Jonathan Hutchinson, he might have left medical practice for a career in philosophy.

Naturally, in a collection of this kind there is bound to be repetition, but here it adds to the work. One sees an observation made and an idea developed and then the subject approached from many different angles until it is treated exhaustively. Jackson came up to London in 1859 at the age of 24 and it is noted that he wasted little time here for his bibliography lists 14 contributions to the literature in 1861.

No need to point out here Jackson's early and abiding interest in convulsive seizures and all conditions which might in any way be related to them. The first volume is occupied considerably with these aspects of his work.

The second volume has three segments. The first is concerned with his evolution and dissolution of the nervous system. The second treats of his more important contributions on speech and the third is a collection of more general nature on various subjects connected with the nervous system. A bibliography of Jackson's works is appended.

It is probable that every neurologist will want to own these volumes, for not only are they source books but they are also of inspirational value. Psychiatrists too should own them, for here was a man with many strings to his bow. He was talking about double consciousness and mental diplopia and writing on the "Psychology of Joking" in 1887. The layout and format of the work is excellent and the publishers are to be congratulated.

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